



February 27, 2025

Matt Hammerstein
Woith Engineering, Inc.
3860 O'Leary Street, Suite A
Missoula, Mt 59808

Reference: Paisley Park Subdivision, Missoula, MT
Project No. 250155

Dear Matt:

The purpose of this letter is to provide a traffic analysis for the Paisley Park Subdivision and verification of recommendations provided in the July 2020 Mullan BUILD traffic study completed by the City of Missoula, Montana. This letter will address existing and projected traffic operations at the intersections of Mullan Road with Chuck Wagon Drive and George Elmer Drive, as well as the future intersection of George Elmer Drive/England Boulevard. In addition to the Mullan BUILD report, traffic impacts in the study area have been previously evaluated in support of the Heron's Landing and Remington Flats subdivisions.

Paisley Park Subdivision proposes the construction of 671 total new dwelling units split across multiple phases. Attachment 7 of the subdivision application illustrates the current proposed layout and phasing plan for the subdivision. The site is located between George Elmer Drive and Chuck Wagon Drive approximately 3/4 mile north of Mullan Road. Access is proposed via Chuck Wagon Drive and England Boulevard. Future connections would include Tenderfoot Way, Riata Road, Camden Street, and Somerset Way.

Existing Conditions

Traffic data was collected at the study area intersections on Tuesday, February 11, 2025, using Miovision Scout video-based systems and a Houston Radar unit. The weekday AM and PM peak hour periods were found to occur from 7:30 to 8:30 AM and 5:00 to 6:00 PM, respectively. Detailed traffic count data worksheets are included in Attachment B.

The Existing Conditions (2025) intersection capacity calculations showed that the Mullan Road/George Elmer Drive and Mullan Road/Chuck Wagon Drive intersections both currently operate at LOS C or better on all approaches in both peak hours. At the Mullan Road/George Elmer Drive roundabout intersection, 95th percentile queues reach up to 9 vehicles on the eastbound approach during the AM peak hour with

queues of up to 6 vehicles on the westbound approach in the PM peak hour. Figure 1 (Attachment A) summarizes the calculated Existing Conditions (2025) peak hour turning movement volumes and LOS results for the AM and PM peak hours. Table 1 below provides a detailed capacity summary table and capacity calculation worksheets can be found in Attachment C.

Table 1: Existing Conditions (2025) Capacity Calculations Summary

Intersection	Approach	Existing (2025)					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		Roundabout					
Mullan Rd & George Elmer Dr	SB	4.2	A	1	6.6	A	1
	EB	15.8	C	9	5.3	A	2
	WB	3.8	A	1	7.8	A	4
	Intersection	12.3	B	--	7.0	A	--
Intersection Control		One-Way Stop-Control (SB)					
Mullan Rd & Chuck Wagon Dr	SB	21.4	C	1	20.7	C	1
	EB	0.1	A	1	0.3	A	1
	WB	0.0	A	0	0.0	A	0
	Intersection	1.1	A	--	0.6	A	--

Trip Generation

This study utilized Trip Generation, 11th Edition, published by the Institute of Transportation Engineers (ITE), which is the most widely accepted source in the United States for determining trip generation projections. For the Paisley Park Subdivision, Land Use Code 210 – Single-Family Detached Housing, Land Use Code 215 – Single-Family Attached Housing, and Land Use Code 220 – Multifamily Housing (Low-Rise) were utilized to project trip generation. Table 2 on the following page illustrates the results of the trip generation calculations for the site.

Full buildout of the Paisley Park Subdivision is projected to generate a total of 4,665 average weekday trips, with 285 trips (69 entering/216 exiting) during the AM peak hour and 365 trips (229 entering/136 exiting) during the PM peak hour.

Table 2: Paisley Park Subdivision Trip Generation Summary

Land Use	Independent Variable		Average Weekday			AM Peak Hour			PM Peak Hour		
	Intensity	Units	total	enter	exit	total	enter	exit	total	enter	exit
Single-Family Detached Housing ¹	51	Dwelling Units	481	241	240	36	9	27	48	30	18
Single-Family Attached Housing ²	12	Dwelling Units	86	43	43	6	2	4	7	4	3
Multifamily Housing (Low-Rise) ³	608	Dwelling Units	4098	2049	2049	243	58	185	310	195	115
Total New Trips			4665	2333	2332	285	69	216	365	229	136

(1) Single-Family Detached Housing - Land Use 210*
 Average Weekday: Units = Dwelling Units
 Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM: Average Rate = 9.43 (50% entering/50% exiting)
 Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM: Average Rate = 0.70 (25% entering/75% exiting)
 (63% entering/37% exiting)

(2) Single-Family Attached Housing - Land Use 215*
 Average Weekday: Units = Dwelling Units
 Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM: Average Rate = 7.20 (50% entering/50% exiting)
 Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM: Average Rate = 0.48 (25% entering/75% exiting)
 (59% entering/41% exiting)

(3) Multifamily Housing (Low-Rise) - Land Use 220*
 Average Weekday: Units = Dwelling Units
 Peak Hour of the Adjacent Street, One Hour between 7 and 9 AM: Average Rate = 6.74 (50% entering/50% exiting)
 Peak Hour of the Adjacent Street, One Hour between 4 and 6 PM: Average Rate = 0.40 (24% entering/76% exiting)
 (63% entering/37% exiting)

*Trip Generation, 11th Edition, Institute of Transportation Engineers, 2021

Trip Distribution, Traffic Assignment, and Future Projections

The trip distribution for this study was calculated based on an inspection of existing traffic patterns, review of the 2020 Mullan BUILD study, and the Heron's Landing and Remington Flats traffic studies, both completed in 2019. Based on this data, it was assumed that 10 percent of all trips would travel to/from the west on Mullan Road, with the remaining 90 percent split between England Boulevard and Mullan Road to the east.

In addition to Paisley Park Subdivision, it is expected that Remington Flats, Heron's Landing, and 44 Ranch subdivisions will be constructed within a similar timeframe. Therefore, current buildout percentages of these subdivisions were estimated and trip generation calculations obtained from the previous traffic studies were applied to complete a projected trip assignment for all subdivisions assuming a completed connection to England Boulevard to the north.

Future projections were then calculated by combining trip assignments from all four developments with Existing Conditions (2025) volumes. A growth rate of 2.0 percent was calculated based on adjacent MDT historical traffic count data and applied only to thru movements on Mullan Road. This growth rate was not applied to other movements, as all other growth in the study area is expected to occur solely due to the developments evaluated. For the purposes of this analysis, it was assumed that all developments would be constructed by 2030. Figure 3 (Attachment A) illustrates the resulting AM and PM peak hour future (2030) traffic volume projections.

Daily trip ends were also calculated for Paisley Park Subdivision and the remaining three subdivisions in the area. Remaining total daily trip projections to be added to George Elmer Drive, Chuck Wagon Drive, and England Boulevard by the four developments are shown in Table 3 below.

Table 3: Study Area Remaining Daily Trip Ends

Street	Paisley Park Daily Trip Ends	Other Subdivision Trip Ends
England Boulevard	3,359	3,324
George Elmer Drive	653	1,477
Chuck Wagon Drive	653	1,354

Future Operations Analysis

Future (2030) capacity results project worsening capacity at both existing intersections, with at least one approach projected to operate at LOS E at each intersection. The new three-leg intersection of George Elmer Drive/England Boulevard was evaluated assuming that the northbound approach would be stop-controlled, and the eastbound and westbound approaches would be free-flowing. With this configuration, the intersection is projected to operate at LOS D on the northbound approach during the PM peak hour. Figure 2 (Attachment A) also illustrates the LOS results. Table 4 on the following page provides a detailed intersection capacity summary table, and capacity calculation worksheets for the Future (2030) traffic projections scenario can be found in Attachment D.

Table 4: Future (2030) Capacity Calculations Summary

Intersection	Approach	Future (2030)					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
<i>Intersection Control</i>		<i>One-Way Stop-Control (NB)</i>					
England Blvd & George Elmer Dr	NB	15.3	C	4	33.4	D	4
	EB	0.0	A	0	0.0	A	0
	WB	4.4	A	1	5.2	A	2
	Intersection	7.7	A	--	8.7	A	--
<i>Intersection Control</i>		<i>Roundabout</i>					
Mullan Rd & George Elmer Dr	SB	5.3	A	1	9.1	A	2
	EB	38.4	E	19	6.4	A	2
	WB	4.1	A	1	9.9	A	6
	Intersection	26.4	D	--	8.9	A	--
<i>Intersection Control</i>		<i>One-Way Stop-Control (SB)</i>					
Mullan Rd & Chuck Wagon Dr	SB	35.0	D	4	42.2	E	3
	EB	0.2	A	1	1.5	A	1
	WB	0.0	A	0	0.0	A	0
	Intersection	4.4	A	--	3.3	A	--

Mitigations Analysis

Auxiliary right- and left-turn lane warrants were evaluated based on the methodology outlined in the MDT Traffic Engineering Manual (November 2007) for the Existing Conditions (2025) and Future (2030) analysis scenarios. It was found that a westbound right-turn lane is warranted at the Mullan Road/Chuck Wagon Drive intersection with current PM peak hour volumes. Currently there is a short westbound right-turn slip lane which has enough length for one to two vehicles. It is not striped and does not provide sufficient deceleration distance, so vehicles have to decelerate in the thru lane before merging into the slip lane. There is also a two-way left-turn lane (TWLTL) on Mullan Road at this intersection, which should be striped as a dedicated eastbound left-turn lane based on the existing and projected left-turn volumes.

A westbound left-turn lane is projected to be warranted at England Boulevard/George Elmer Drive intersection in the Future (2030) scenario. A sensitivity analysis of this warrant revealed that the turn lane is likely to become warranted as soon as the west leg of the intersection is constructed and opened with less than 10 percent of construction completed on the adjacent developments. Turn lane warrant worksheets can be found in Attachment E.

A preliminary traffic signal warrant analysis was completed at the Mullan Road/Chuck Wagon Drive intersection using criteria outlined in the MUTCD. The MUTCD presents several warrants that can be considered based on traffic volumes, school crossings, crash history, and others. As only four hours of traffic data was processed, not all warrants could be fully evaluated. It was found that the Four-Hour Vehicular Volume and Peak Hour warrants are projected to be met at this intersection in 2030. A sensitivity analysis showed that minor approach volumes are not likely to become great enough to meet the Four-Hour warrant until approximately 90 percent of the area developments are completed, and 50 percent buildout would be required to meet the Peak Hour Warrant. However, it should be noted that a large proportion of the minor approach volumes at this intersection are projected to be right turns and may be excluded from the signal warrant analysis given that there is currently a dedicated southbound right-turn lane. Traffic signal warrant worksheets can be found in Attachment E.

Future volumes at the Mullan Road/Chuck Wagon Drive intersection are likely to vary depending on operations at the intersection, and a higher number of vehicles may opt to use the roundabout at George Elmer Drive if wait times become too lengthy. This could eventually lead to a strain on the roundabout and a higher form of traffic control could become necessary at Chuck Wagon Drive to balance demand between

the two intersections. Additionally, the remaining undeveloped area of 44 Ranch Subdivision is located almost entirely west of Chuck Wagon Drive without a direct route to access George Elmer Drive, and Heron's Landing Subdivision is also likely to contribute a large volume of trips to Chuck Wagon Drive. Therefore, buildup of these subdivisions is likely to have the greatest impact on operations at the Mullan Road/Chuck Wagon Drive intersection compared to the Remington Flats and Paisley Park Subdivisions further north, which will have direct access to both routes. Another connection to Mullan Road to the west is proposed with Phase 17 of the 44 Ranch Subdivision via Shindig Drive which may divert some of the traffic from the Chuck Wagon Drive intersection. Due to these factors, traffic volumes and operations should continue to be monitored particularly in regard to development progression of the 44 Ranch and Heron's Landing Subdivisions and installation of a traffic signal or roundabout should be considered.

The Peak Hour signal warrant was also evaluated at the England Boulevard/George Elmer Drive intersection with Future (2030) projections, and it was not found to be met with the available data.

Future (2030) intersection capacity calculations were evaluated with various improvements for the England Boulevard/George Elmer Drive and Mullan Road/Chuck Wagon Drive intersections. Improved capacity calculations for the Future (2030) scenario can be found in Table 5 on the following page and the calculation worksheets are in Attachment F.

England Boulevard/George Elmer Drive: Installation of a westbound left-turn lane is projected to improve delay on the northbound approach by nearly 5.0 seconds per vehicle during the PM peak hour, but would remain at LOS D. The addition of separate northbound left-turn and right-turn lanes is projected to improve capacity to LOS C or better on all approaches during both peak hours. When modeled with all-way stop control, the westbound approach is projected to operate at LOS F during the PM peak hour with severe delay and 95th percentile queueing. This is due to the very high existing and projected westbound left-turning volumes. It is therefore not recommended to implement a stop condition for this movement. A roundabout is projected to operate at LOS A on all approaches.

Table 5: Future (2030) Capacity Calculations Summary - Improvements

Intersection	Approach	Future with Improvements (2030)					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		One-Way Stop-Control (NB), WB Left-Turn Lane					
England Blvd & George Elmer Dr	NB	15.3	C	4	28.9	D	4
	EB	0.0	A	0	0.0	A	0
	WB	4.5	A	1	5.7	A	2
	Intersection	7.7	A	--	8.3	A	--
Intersection Control		One-Way Stop-Control (NB), WB LT, NB LT & RT Lanes					
England Blvd & George Elmer Dr	NB	14.6	B	3	21.2	C	2
	EB	0.0	A	0	0.0	A	0
	WB	4.5	A	1	5.7	A	2
	Intersection	7.4	A	--	7.1	A	--
Intersection Control		All-Way Stop-Control					
England Blvd & George Elmer Dr	NB	12.5	B	3	11.0	B	2
	EB	12.2	B	3	10.5	B	2
	WB	10.9	B	2	73.9	F	21
	Intersection	12.0	B	--	53.5	F	--
Intersection Control		Roundabout					
England Blvd & George Elmer Dr	NB	7.6	A	2	4.6	A	1
	EB	5.3	A	1	7.0	A	1
	WB	3.9	A	1	9.8	A	5
	Intersection	6.0	A	--	8.6	A	--
Intersection Control		One-Way Stop-Control (SB), WB Right-Turn Lane					
Mullan Rd & Chuck Wagon Dr	SB	33.2	D	4	37.2	E	3
	EB	0.2	A	1	1.5	A	1
	WB	0.0	A	0	0.0	A	0
	Intersection	4.2	A	--	2.9	A	--
Intersection Control		Signalized					
Mullan Rd & Chuck Wagon Dr	SB	16.2	B	2	18.9	B	1
	EB	8.0	A	2	4.1	A	1
	WB	2.7	A	1	6.0	A	2
	Intersection	8.0	A	--	6.3	A	--
Intersection Control		Roundabout					
Mullan Rd & Chuck Wagon Dr	SB	3.8	A	1	6.8	A	1
	EB	15.5	C	9	5.2	A	2
	WB	4.5	A	1	16.0	C	9
	Intersection	12.1	B	--	12.0	B	--

Consideration should be given to installing a roundabout at the England Boulevard/George Elmer Drive intersection once the west leg is constructed to provide traffic calming as well as reserve capacity at the intersection. Construction of the turn lanes required to improve operations to LOS C would require a similar level of roadway widening to a roundabout without providing the additional capacity and safety benefits. Installation of the northbound left- and right-turn lanes with the

westbound left-turn lane and a stop sign on the south leg is recommended until the roundabout can be constructed. The conclusion to ultimately install a roundabout is consistent with the recommendation from the Mullan BUILD study. The City would need to secure right-of-way and Paisley Park Subdivision would be required to financially contribute in order for the roundabout construction to begin. With stop-control only on the northbound approach, vehicles on England Boulevard would not have an incentive to slow through the intersection, especially while area construction is ongoing and traffic volumes are relatively low. Installation of curb bulb-outs and raised crosswalks or a raised intersection would match the proposed cross-sections to the west, promote traffic calming and pedestrian safety, and should be considered until a roundabout is installed at this intersection. Roundabouts generally experience a lower number of crashes, better vehicle capacity results, and the most impactful traffic calming effects compared to stop-controlled intersections.

Mullan Road/Chuck Wagon Drive: The westbound right-turn slip lane currently is not striped and is long enough to fit only one or two vehicles. Delineating this turn lane would improve operations by making it more evident the turn lane is separate from the thru lane. If the slip lane was expanded to be full-length, it would allow for vehicles to enter the turn lane before decelerating which would reduce delay for westbound thru movements. This intersection is projected to operate at LOS C or better on all approaches with the installation of a traffic signal or a roundabout. As discussed in the traffic signal warrants section of this letter, traffic volumes at this intersection should be monitored with respect to the buildout timelines of the new connection to Mullan Road, the 44 Ranch Subdivision, and the Heron's Landing Subdivision and installation of a traffic signal or roundabout should be considered. The volumes added to the street network by all currently planned area developments are likely to exceed the combined existing capacity of the George Elmer Drive roundabout and the Chuck Wagon Drive intersections with Mullan Road as-is.

Recommendations

Based on the above results, it is recommended that a westbound left-turn lane and northbound right- and left-turn lanes are installed with a stop sign on the south leg of the England Boulevard/George Elmer Drive intersection upon completion of the west leg as an interim measure until a roundabout can be constructed. This interim condition should include curb bulb-outs with consideration given to also including raised crosswalks or construction of a raised intersection to promote traffic calming. This configuration will provide sufficient vehicle capacity for the buildout of this area in the short term. A roundabout should ultimately be installed at this location, consistent with the recommendation in the Mullan BUILD study, which would provide adequate vehicle capacity and traffic calming measures to accommodate potential

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future connections to the north. The City will need to secure right-of-way for this roundabout and Paisley Park Subdivision will be required to contribute financially.

The intersection of Mullan Road/Chuck Wagon Drive should continue to be monitored through the construction of the 44 Ranch and Heron's Landing Subdivisions, which will supply the majority of new traffic to that intersection. Traffic should also be monitored at this intersection when the new connection to Mullan Road via Shindig Drive is completed. Based on long-term traffic forecasting, a traffic signal/roundabout should be considered at the intersection upon buildout of approximately 90 percent of the area developments. Prior to this, consideration should be given to striping and extending the existing westbound right-turn slip lane.

If you have any questions about this assessment, or if additional analysis is required, please feel free to contact me at 406-922-4306 or jstaszuk@sanbell.com.

Sincerely,



Joey Staszuk, PE, PTOE, RSP1
Associate Principal | Community Transportation Studio Manager

SJW/ars/jhs/SG



Enc.
Attachment A. Figures
Attachment B. Traffic Count Data Worksheets
Attachment C. Capacity Calculations - Existing Conditions (2025)
Attachment D. Capacity Calculations - Future (2030)
Attachment E. Warrants
Attachment F. Capacity Calculations - Future Improved (2030)

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FIGURES

ATTACHMENT A

Intelligent Infrastructure.
Enduring Communities.

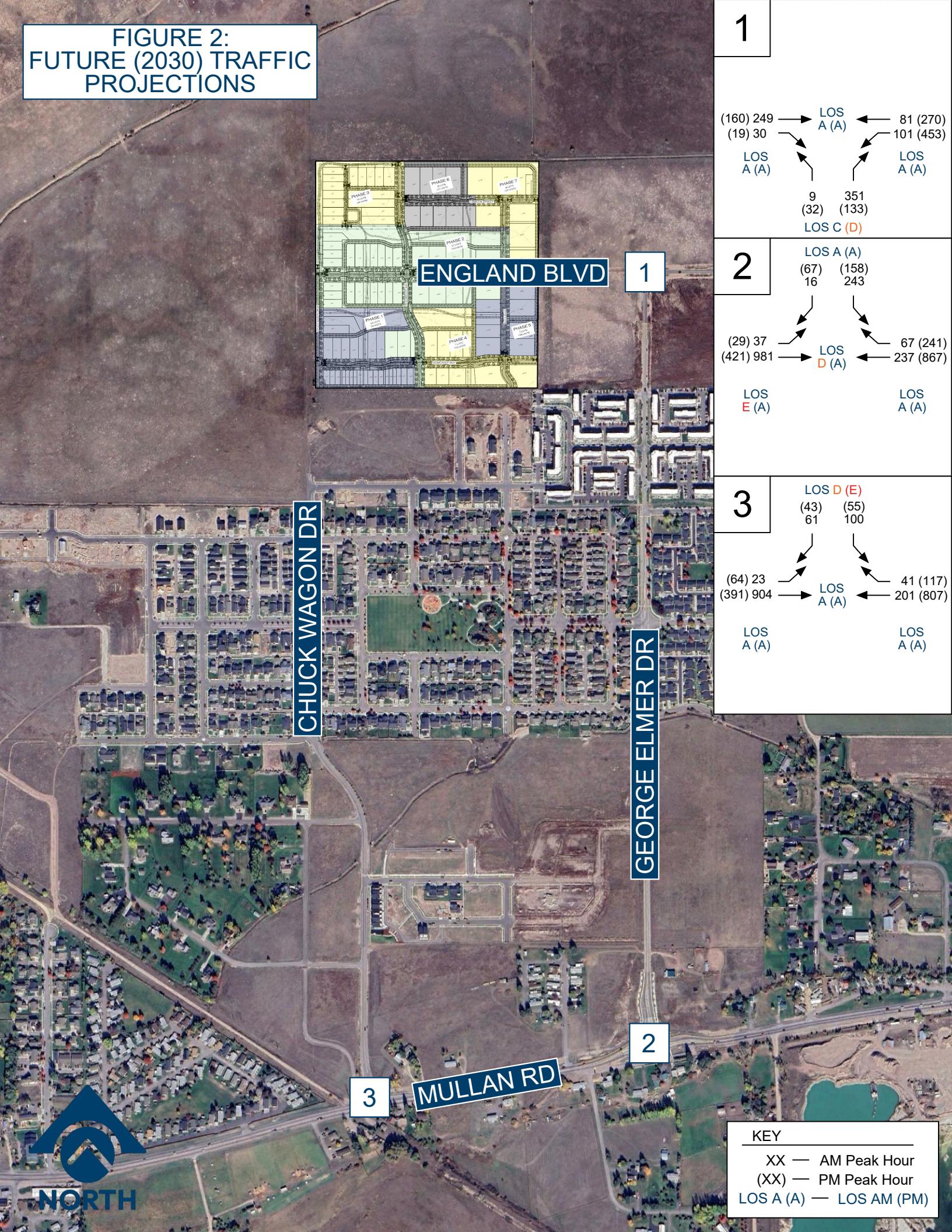


FIGURE 1:
EXISTING CONDITIONS (2025)
PEAK HOUR TRAFFIC VOLUMES

1



FIGURE 2:
FUTURE (2030) TRAFFIC
PROJECTIONS



TRAFFIC COUNT DATA WORKSHEETS

ATTACHMENT B

Intelligent Infrastructure.
Enduring Communities.



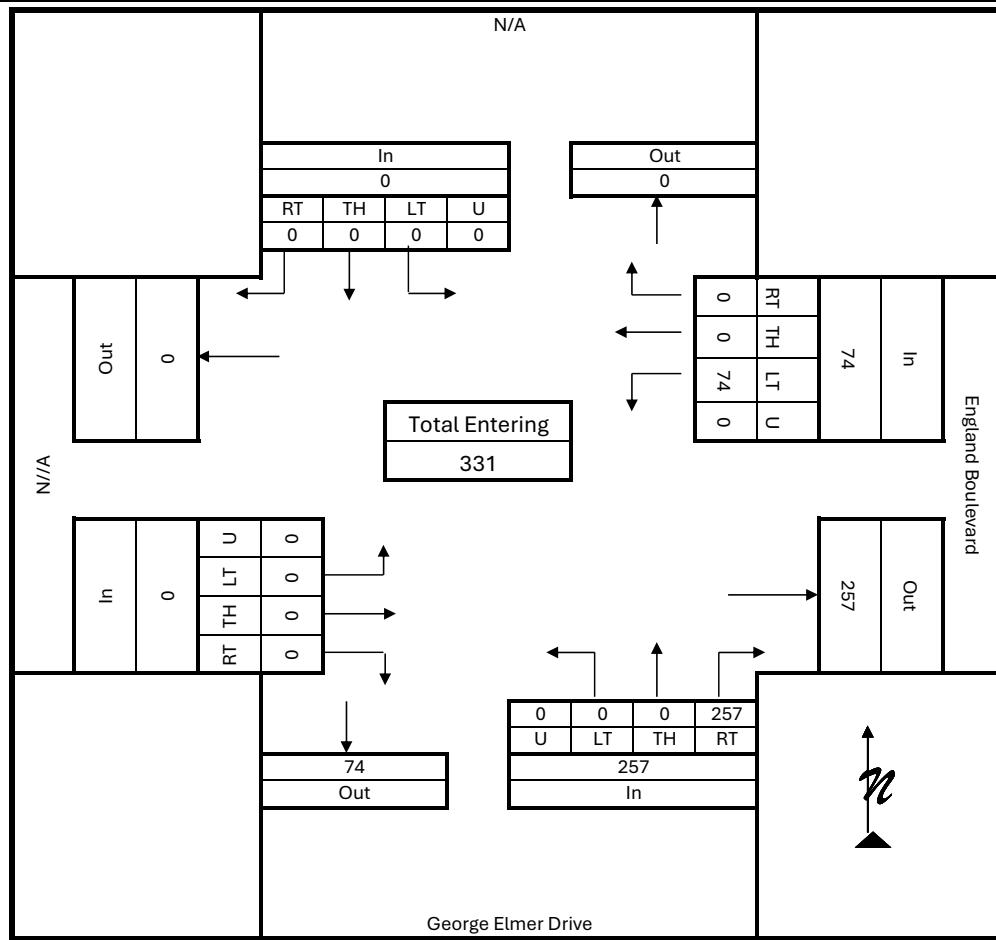
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Kole Ketterling	Intersection:	England Blvd & George Elmer Dr
Agency/Company:	Sanbell	Jurisdiction:	Missoula, MT /MDT
Date Performed:	Tuesday, February 11, 2025		
Count Time Period:	AM Peak Hour (7:30 - 8:30 AM)		
Project Number:	250155	Project Description:	Paisley Park Subdivision
North/South Street:	George Elmer Drive	East/West Street:	England Boulevard

Vehicle Volumes and Adjustments

	N/A Southbound					George Elmer Drive Northbound					N/A Eastbound					England Boulevard Westbound					Int. Total
	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	
Start Time	1.00	1.00	1.00	1.00	5.00	1.00	1.00	1.00	1.00	4.00	1.06	1.06	1.06	1.06	4.00	1.06	1.06	1.06	1.06	4.00	
Factor	1.00	1.00	1.00	1.00	5.00	1.00	1.00	1.00	1.00	4.00	1.06	1.06	1.06	1.06	4.00	1.06	1.06	1.06	1.06	4.00	
7:30 AM	0	0	0	0	0	66	0	0	0	66	0	0	0	0	0	0	0	13	0	13	79
7:45 AM	0	0	0	0	0	92	0	0	0	92	0	0	0	0	0	0	0	16	0	16	108
8:00 AM	0	0	0	0	0	67	0	0	0	67	0	0	0	0	0	0	0	18	0	18	85
8:15 AM	0	0	0	0	0	32	0	0	0	32	0	0	0	0	0	0	0	27	0	27	59
Grand Total	0	0	0	0	0	257	0	0	0	257	0	0	0	0	0	0	0	74	0	74	331
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total %	0.0	0.0	0.0	0.0	0.0	77.6	0.0	0.0	0.0	77.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.4	0.0	22.4	100.0
PHF	1.00	1.00	1.00			0.70	0.70	0.70			1.00	1.00	1.00			1.00	1.00	1.00			0.76



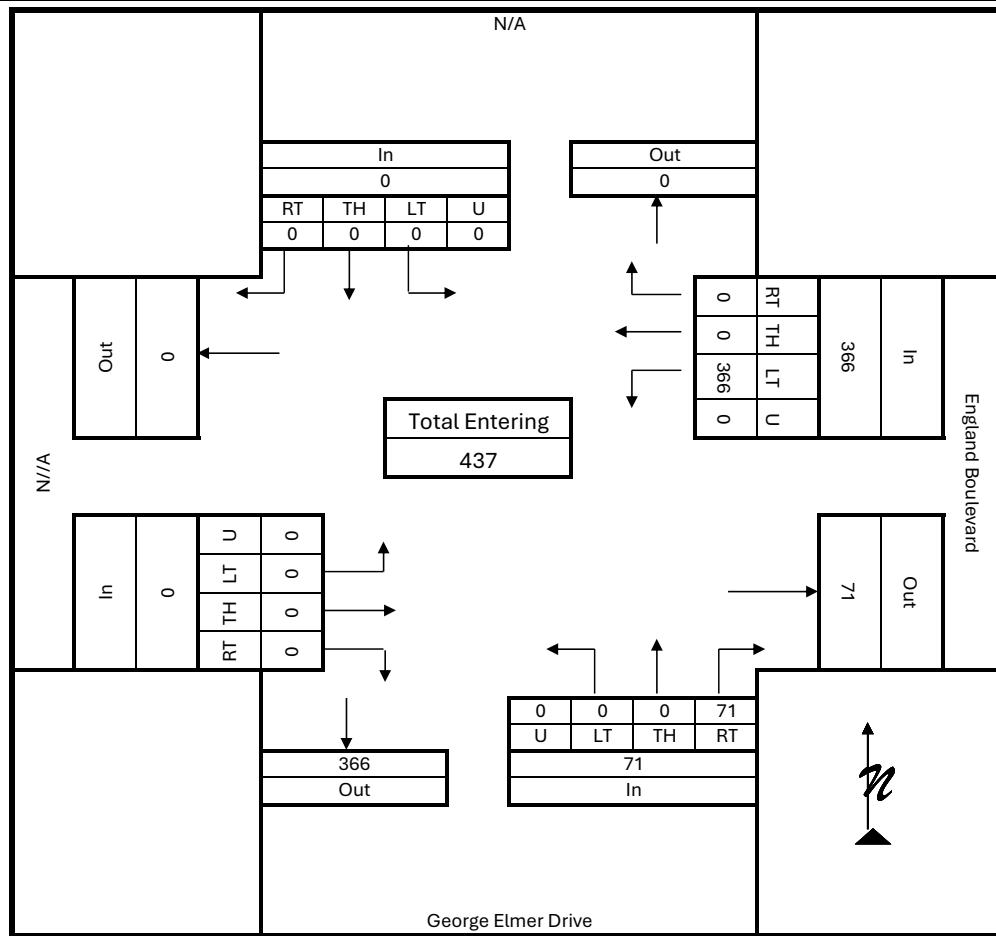
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Agency/Company:	Sanbell	Jurisdiction:	Missoula, MT /MDT
Date Performed:	Tuesday, February 11, 2025		
Count Time Period:	PM Peak Hour (5:00 - 6:00 PM)		
Project Number:	250155	Project Description:	Paisley Park Subdivision
North/South Street:	George Elmer Drive	East/West Street:	England Boulevard

Vehicle Volumes and Adjustments

Start Time	N/A					George Elmer Drive					N/A					England Boulevard					Int. Total
	Southbound					Northbound					Eastbound					Westbound					
Factor	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	
5:00 PM	0	0	0	0	0	21	0	0	0	21	0	0	0	0	0	0	0	120	0	120	141
5:15 PM	0	0	0	0	0	16	0	0	0	16	0	0	0	0	0	0	0	89	0	89	105
5:30 PM	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	94	0	94	105
5:45 PM	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	63	0	63	86
Grand Total	0	0	0	0	0	71	0	0	0	71	0	0	0	0	0	0	0	366	0	366	437
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total %	0.0	0.0	0.0	0.0	0.0	16.2	0.0	0.0	0.0	16.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.8	0.0	83.8	100.0
PHF	1.00	1.00	1.00			0.85	0.85	0.85			1.00	1.00	1.00			0.78	0.78	0.78			0.79



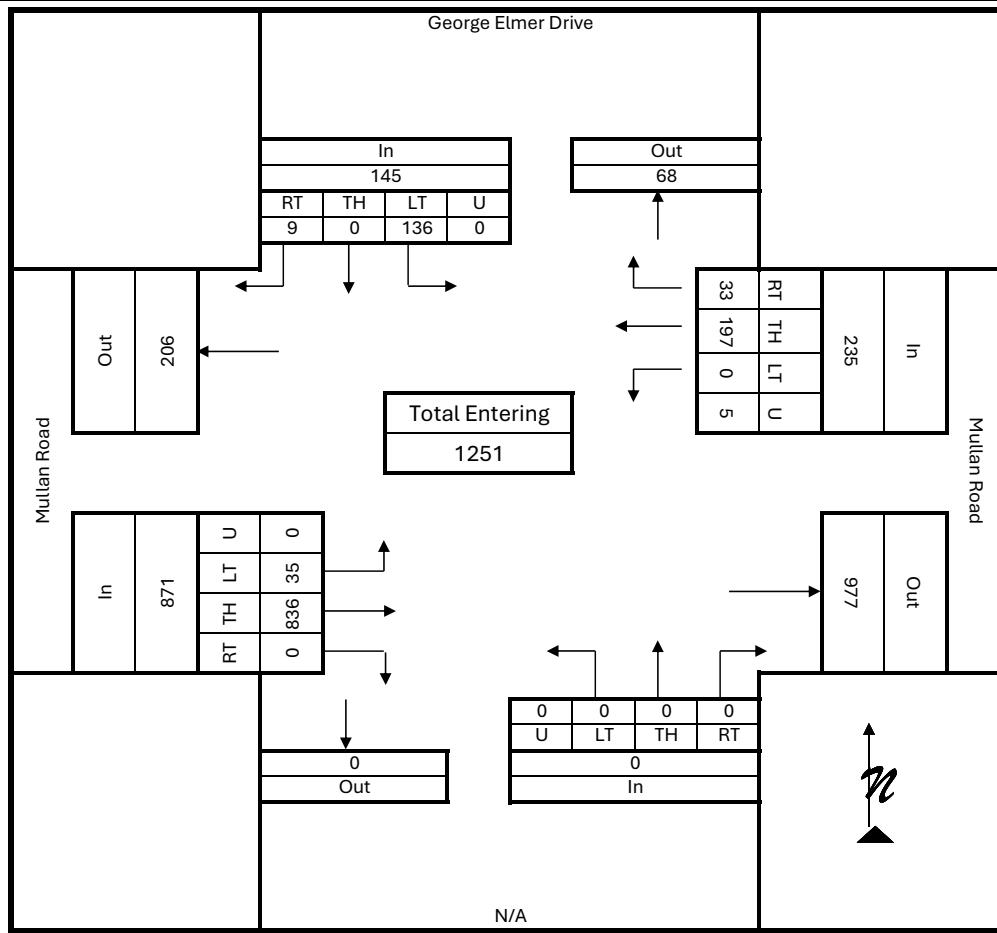
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Count Time Period:	AM Peak Hour (7:30 - 8:30 AM)		
Project Number:	250155	Project Description:	Paisley Park Subdivision
North/South Street:	George Elmer Drive	East/West Street:	Mullan Road

Vehicle Volumes and Adjustments

Start Time	George Elmer Drive Southbound					N/A Northbound					Mullan Road Eastbound					Mullan Road Westbound					Int. Total
	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.06	1.06	1.06	1.06		1.06	1.06	1.06	1.06		
7:30 AM	3	0	42	0	45	0	0	0	0	0	0	234	8	0	242	10	43	0	1	54	341
7:45 AM	1	0	33	0	34	0	0	0	0	0	0	228	17	0	245	6	35	0	0	41	320
8:00 AM	4	0	30	0	34	0	0	0	0	0	0	206	8	0	214	5	49	0	2	56	304
8:15 AM	1	0	31	0	32	0	0	0	0	0	0	168	2	0	170	12	70	0	2	84	286
Grand Total	9	0	136	0	145	0	0	0	0	0	0	836	35	0	871	33	197	0	5	235	1251
Medium Truck %	11.1	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.9	0.0	1.6	0.0	4.6	0.0	20.0	4.3	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	11.1	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.9	0.0	1.6	0.0	4.6	0.0	20.0	4.3	
Total %	0.7	0.0	10.9	0.0	11.6	0.0	0.0	0.0	0.0	0.0	0.0	66.8	2.8	0.0	69.6	2.6	15.7	0.0	0.4	18.8	100.0
PHF	0.81	0.81	0.81			1.00	1.00	1.00			0.90	0.90	0.90			1.00	1.00	1.00			0.92



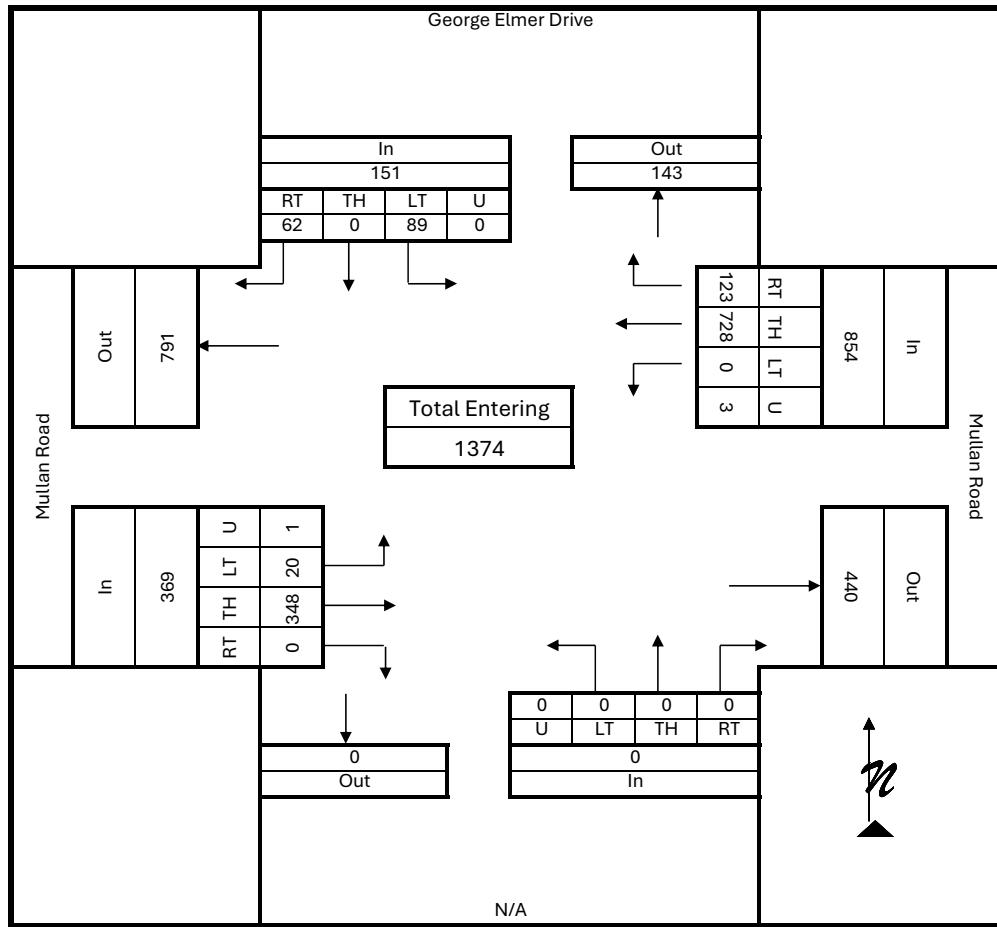
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Kole Ketterling	Intersection:	Mullan Rd & George Elmer Dr
Agency/Company:	Sanbell	Jurisdiction:	Missoula, MT /MDT
Date Performed:	Tuesday, February 11, 2025		
Count Time Period:	PM Peak Hour (5:00 - 6:00 PM)		
Project Number:	250155	Project Description:	Paisley Park Subdivision
North/South Street:	George Elmer Drive	East/West Street:	Mullan Road

Vehicle Volumes and Adjustments

	George Elmer Drive Southbound					N/A Northbound					Mullan Road Eastbound					Mullan Road Westbound					Int. Total
	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	
Start Time	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.06	1.06	1.06	1.06		1.06	1.06	1.06	1.06		
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.06	1.06	1.06	1.06		1.06	1.06	1.06	1.06		
5:00 PM	13	0	15	0	28	0	0	0	0	0	0	89	6	0	95	29	178	0	1	208	331
5:15 PM	14	0	24	0	38	0	0	0	0	0	0	67	5	0	72	33	187	0	0	220	330
5:30 PM	21	0	23	0	44	0	0	0	0	0	0	95	2	0	97	27	171	0	2	200	341
5:45 PM	14	0	27	0	41	0	0	0	0	0	0	97	7	1	105	34	192	0	0	226	372
Grand Total	62	0	89	0	151	0	0	0	0	0	0	348	20	1	369	123	728	0	3	854	1374
Medium Truck %	1.6	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	1.6	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	
Total %	4.5	0.0	6.5	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	25.3	1.5	0.1	26.9	9.0	53.0	0.0	0.2	62.2	100.0
PHF	0.92	0.92	0.92			1.00	1.00	1.00			0.88	0.88	0.88			0.94	0.94	0.94			0.92



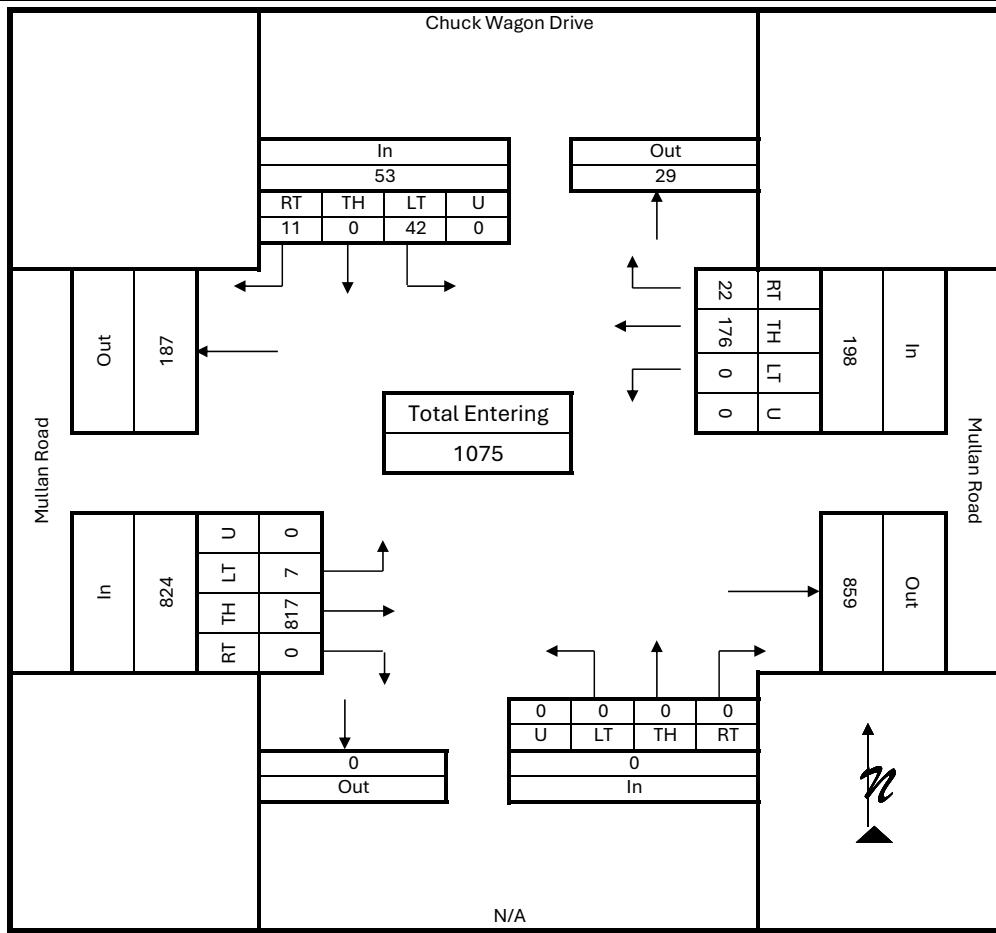
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Kole Ketterling	Intersection:	Mullan Rd & Chuck Wagon Dr
Agency/Company:	Sanbell	Jurisdiction:	Missoula, MT /MDT
Date Performed:	Tuesday, February 11, 2025		
Count Time Period:	AM Peak Hour (7:30 - 8:30 AM)		
Project Number:	250155	Project Description:	Paisley Park Subdivision
North/South Street:	Chuck Wagon Drive	East/West Street:	Mullan Road

Vehicle Volumes and Adjustments

	Chuck Wagon Drive Southbound					N/A Northbound					Mullan Road Eastbound					Mullan Road Westbound					Int. Total
	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	
Start Time	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.06	1.06	1.06	1.06		1.06	1.06	1.06	1.06		
Factor	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.06	1.06	1.06	1.06		1.06	1.06	1.06	1.06		
7:30 AM	3	0	11	0	14	0	0	0	0	0	0	230	3	0	233	6	39	0	0	45	292
7:45 AM	5	0	9	0	14	0	0	0	0	0	0	229	2	0	231	5	32	0	0	37	282
8:00 AM	2	0	13	0	15	0	0	0	0	0	0	207	2	0	209	8	39	0	0	47	271
8:15 AM	1	0	9	0	10	0	0	0	0	0	0	151	0	0	151	3	66	0	0	69	230
Grand Total	11	0	42	0	53	0	0	0	0	0	0	817	7	0	824	22	176	0	0	198	1075
Medium Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	1.7	0.0	5.7	0.0	0.0	5.1	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	1.7	0.0	5.7	0.0	0.0	5.1	
Total %	1.0	0.0	3.9	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	76.0	0.7	0.0	76.7	2.0	16.4	0.0	0.0	18.4	100.0
PHF	0.95	0.95	0.95			1.00	1.00	1.00			0.88	0.88	0.88			1.00	1.00	1.00			0.92



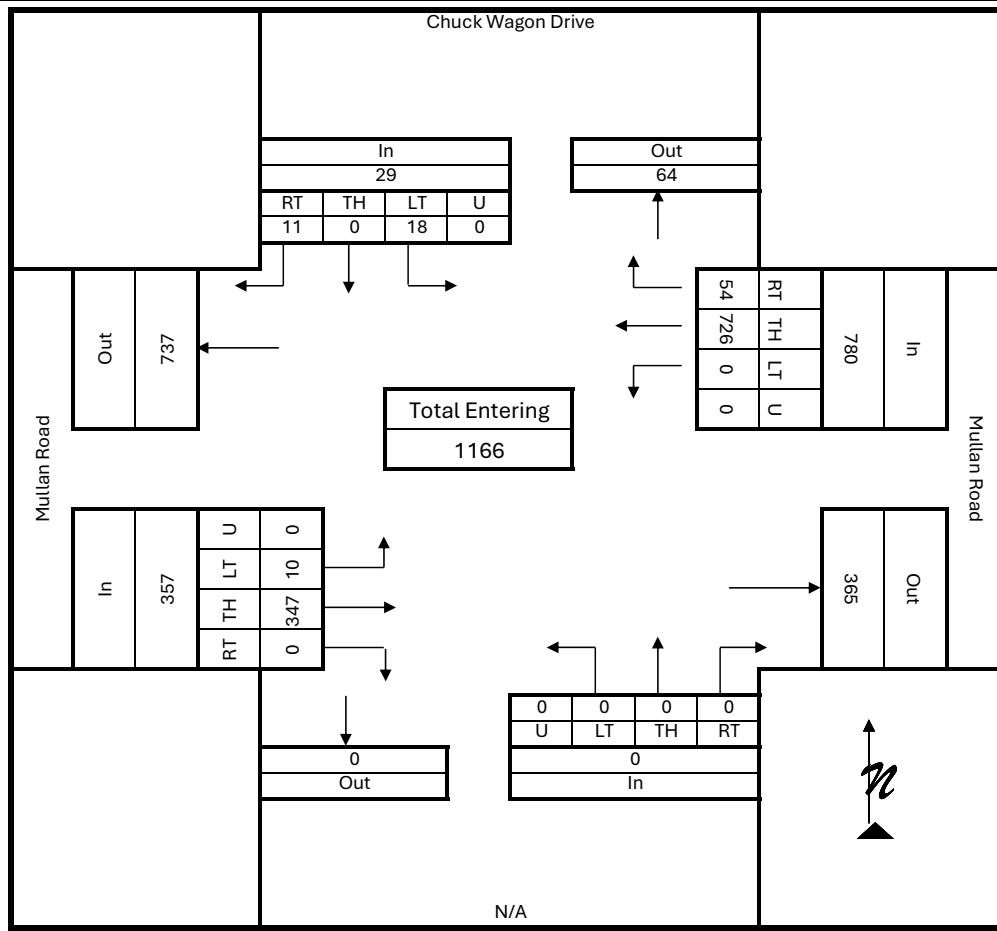
INTERSECTION TURNING MOVEMENT COUNT SUMMARY

General Information

Counted By:	Kole Ketterling	Intersection:	Mullan Rd & Chuck Wagon Dr
Agency/Company:	Sanbell	Jurisdiction:	Missoula, MT /MDT
Date Performed:	Tuesday, February 11, 2025		
Count Time Period:	PM Peak Hour (5:00 - 6:00 PM)		
Project Number:	250155	Project Description:	Paisley Park Subdivision
North/South Street:	Chuck Wagon Drive	East/West Street:	Mullan Road

Vehicle Volumes and Adjustments

	Chuck Wagon Drive Southbound					N/A Northbound					Mullan Road Eastbound					Mullan Road Westbound					Int. Total	
	Start Time	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	Right	Thru	Left	U-turn	Total	
Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.06	1.06	1.06	1.06		1.06	1.06	1.06	1.06		
5:00 PM		2	0	6	0	8	0	0	0	0	0	0	88	5	0	93	11	177	0	0	188	289
5:15 PM		5	0	6	0	11	0	0	0	0	0	0	67	3	0	70	22	180	0	0	202	283
5:30 PM		3	0	3	0	6	0	0	0	0	0	0	91	0	0	91	11	179	0	0	190	287
5:45 PM		1	0	3	0	4	0	0	0	0	0	0	101	2	0	103	10	190	0	0	200	307
Grand Total		11	0	18	0	29	0	0	0	0	0	0	347	10	0	357	54	726	0	0	780	1166
Medium Truck %	9.1	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	
Heavy Truck %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Truck %	9.1	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	
Total %	0.9	0.0	1.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.8	0.9	0.0	30.6	4.6	62.3	0.0	0.0	66.9	100.0
PHF	1.00	1.00	1.00			1.00	1.00	1.00					0.86	0.86	0.86			0.97	0.97	0.97		0.95



CAPACITY CALCULATIONS – EXISTING CONDITIONS (2025)

ATTACHMENT C

Intelligent Infrastructure.
Enduring Communities.



Intersection	Approach	Existing (2025)					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		Roundabout					
Mullan Rd & George Elmer Dr	SB	4.2	A	1	6.6	A	1
	EB	15.8	C	9	5.3	A	2
	WB	3.8	A	1	7.8	A	4
	Intersection	12.3	B	--	7.0	A	--
Intersection Control		One-Way Stop-Control (SB)					
Mullan Rd & Chuck Wagon Dr	SB	21.4	C	1	20.7	C	1
	EB	0.1	A	1	0.3	A	1
	WB	0.0	A	0	0.0	A	0
	Intersection	1.1	A	--	0.6	A	--

Intersection Level Of Service Report
Intersection 2: Mullan Rd & George Elmer Dr

Control Type: Roundabout Delay (sec / veh): 12.3
Analysis Method: HCM 7th Edition Level Of Service: B
Analysis Period: 15 minutes

Intersection Setup

Name	George Elmer Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	George Elmer Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	136	9	35	836	197	33
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	2.90	1.60	4.60	0.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	136	9	35	836	197	33
Peak Hour Factor	0.8100	0.8100	0.9000	0.9000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	3	10	232	49	8
Total Analysis Volume [veh/h]	168	11	39	929	197	33
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Number of Conflicting Circulating Lanes	1		1		1	
Circulating Flow Rate [veh/h]	206		168		40	
Exiting Flow Rate [veh/h]	73		218		1112	
Demand Flow Rate [veh/h]	136	9	35	836	197	33
Adjusted Demand Flow Rate [veh/h]	168	11	39	929	197	33

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	0.95	0.97	0.98	0.96	1.00
Entry Flow Rate [veh/h]	168	12	41	944	207	33
Capacity of Entry and Bypass Lanes [veh/h]	1178	1178	1219	1219	1370	1370
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1178	1122	1185	1200	1309	1370
X, volume / capacity	0.14	0.01	0.03	0.77	0.15	0.02

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	C	A	A				
95th-Percentile Queue Length [veh]	0.50	0.03	0.10	8.28	0.53	0.07				
95th-Percentile Queue Length [ft]	12.44	0.74	2.55	206.93	13.24	1.85				
Approach Delay [s/veh]	4.22		15.78		3.82					
Approach LOS	A		C		A					
Intersection Delay [s/veh]	12.28									
Intersection LOS	B									

Intersection Level Of Service Report
Intersection 3: Mullan Rd & Chuck Wagon Dr

Control Type:	Two-way stop	Delay (sec / veh):	24.8
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.195

Intersection Setup

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	42	11	7	817	176	22
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	1.70	5.70	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	42	11	7	817	176	22
Peak Hour Factor	0.9500	0.9500	0.8800	0.8800	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	3	2	232	44	6
Total Analysis Volume [veh/h]	44	12	8	928	176	22
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.01	0.01	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	24.77	9.24	7.61	0.00	0.00	0.00
Movement LOS	C	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.70	0.04	0.02	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	17.61	1.06	0.44	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	21.44		0.07		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]			1.06			
Intersection LOS			C			

Intersection Level Of Service Report
Intersection 2: Mullan Rd & George Elmer Dr

Control Type: Roundabout Delay (sec / veh): 7.0
Analysis Method: HCM 7th Edition Level Of Service: A
Analysis Period: 15 minutes

Intersection Setup

Name	George Elmer Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	George Elmer Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	89	62	21	348	728	123
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	1.60	0.00	0.00	0.10	0.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	89	62	21	348	728	123
Peak Hour Factor	0.9200	0.9200	0.8800	0.8800	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	17	6	99	194	33
Total Analysis Volume [veh/h]	97	67	24	395	774	131
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Number of Conflicting Circulating Lanes	1		1		1	
Circulating Flow Rate [veh/h]	775		97		24	
Exiting Flow Rate [veh/h]	155		843		492	
Demand Flow Rate [veh/h]	89	62	21	348	728	123
Adjusted Demand Flow Rate [veh/h]	97	67	24	395	774	131

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	0.98	1.00	1.00	1.00	1.00
Entry Flow Rate [veh/h]	97	69	24	395	775	131
Capacity of Entry and Bypass Lanes [veh/h]	702	702	1301	1301	1390	1390
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	702	691	1301	1301	1388	1390
X, volume / capacity	0.14	0.10	0.02	0.30	0.56	0.09

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A				
95th-Percentile Queue Length [veh]	0.48	0.32	0.06	1.29	3.61	0.31				
95th-Percentile Queue Length [ft]	11.96	8.03	1.41	32.36	90.30	7.79				
Approach Delay [s/veh]	6.49		5.34		7.84					
Approach LOS	A		A		A					
Intersection Delay [s/veh]	6.99									
Intersection LOS	A									

Intersection Level Of Service Report
Intersection 3: Mullan Rd & Chuck Wagon Dr

Control Type:	Two-way stop	Delay (sec / veh):	24.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.089

Intersection Setup

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	18	11	10	347	726	54
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	0.00	0.00	0.30	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	18	11	10	347	726	54
Peak Hour Factor	1.0000	1.0000	0.8600	0.8600	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	3	3	101	187	14
Total Analysis Volume [veh/h]	18	11	12	403	748	56
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.03	0.01	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	24.50	14.43	9.41	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.29	0.09	0.04	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	7.22	2.16	1.10	0.00	0.00	0.00
d_A, Approach Delay [s/veh]		20.68		0.27		0.00
Approach LOS		C		A		A
d_I, Intersection Delay [s/veh]				0.57		
Intersection LOS				C		

CAPACITY CALCULATIONS – FUTURE (2030)

ATTACHMENT D

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Intersection	Approach	Future (2030)					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		One-Way Stop-Control (NB)					
England Blvd & George Elmer	NB	15.3	C	4	33.4	D	4
	EB	0.0	A	0	0.0	A	0
	WB	4.4	A	1	5.2	A	2
	Intersection	7.7	A	--	8.7	A	--
Intersection Control		Roundabout					
Mullan Rd & George Elmer Dr	SB	5.3	A	1	9.1	A	2
	EB	38.4	E	19	6.4	A	2
	WB	4.1	A	1	9.9	A	6
	Intersection	26.4	D	--	8.9	A	--
Intersection Control		One-Way Stop-Control (SB)					
Mullan Rd & Chuck Wagon Dr	SB	35.0	D	4	42.2	E	3
	EB	0.2	A	1	1.5	A	1
	WB	0.0	A	0	0.0	A	0
	Intersection	4.4	A	--	3.3	A	--

Intersection Level Of Service Report
Intersection 1: England Blvd & George Elmer Dr

Control Type: Two-way stop Delay (sec / veh): 18.4
Analysis Method: HCM 7th Edition Level Of Service: C
Analysis Period: 15 minutes Volume to Capacity (v/c): 0.005

Intersection Setup

Name	George Elmer Drive		England Boulevard		England Boulevard	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	George Elmer Drive		England Boulevard		England Boulevard	
Base Volume Input [veh/h]	2	351	249	30	101	81
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	351	249	30	101	81
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	95	68	8	27	22
Total Analysis Volume [veh/h]	2	382	271	33	110	88
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.51	0.00	0.00	0.09	0.00
d_M, Delay for Movement [s/veh]	18.45	14.74	0.00	0.00	7.99	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	2.97	2.97	0.00	0.00	0.20	0.20
95th-Percentile Queue Length [ft/ln]	74.17	74.17	0.00	0.00	4.88	4.88
d_A, Approach Delay [s/veh]	14.76		0.00		4.44	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]			7.39			
Intersection LOS			C			

Intersection Level Of Service Report
Intersection 2: Mullan Rd & George Elmer Dr

Control Type: Roundabout Delay (sec / veh): 26.4
Analysis Method: HCM 7th Edition Level Of Service: D
Analysis Period: 15 minutes

Intersection Setup

Name	George Elmer Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	George Elmer Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	243	16	37	981	237	67
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	2.90	1.60	4.60	0.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	243	16	37	981	237	67
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	66	4	10	267	64	18
Total Analysis Volume [veh/h]	264	17	40	1066	258	73
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Number of Conflicting Circulating Lanes	1		1		1	
Circulating Flow Rate [veh/h]	270		264		41	
Exiting Flow Rate [veh/h]	114		288		1347	
Demand Flow Rate [veh/h]	243	16	37	981	237	67
Adjusted Demand Flow Rate [veh/h]	264	17	40	1066	258	73

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	0.95	0.97	0.98	0.96	1.00
Entry Flow Rate [veh/h]	264	18	42	1084	270	73
Capacity of Entry and Bypass Lanes [veh/h]	1111	1111	1117	1117	1368	1368
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1111	1058	1086	1100	1308	1368
X, volume / capacity	0.24	0.02	0.04	0.97	0.20	0.05

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	E	A	A				
95th-Percentile Queue Length [veh]	0.93	0.05	0.11	18.03	0.73	0.17				
95th-Percentile Queue Length [ft]	23.18	1.22	2.87	450.71	18.33	4.22				
Approach Delay [s/veh]	5.32		38.44		4.11					
Approach LOS	A		E		A					
Intersection Delay [s/veh]	26.41									
Intersection LOS	D									

Intersection Level Of Service Report
Intersection 3: Mullan Rd & Chuck Wagon Dr

Control Type:	Two-way stop	Delay (sec / veh):	50.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.596

Intersection Setup

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	100	61	23	904	201	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	1.70	5.70	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	100	61	23	904	201	41
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	17	6	246	55	11
Total Analysis Volume [veh/h]	109	66	25	983	218	45
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.60	0.08	0.02	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	50.19	9.88	7.80	0.00	0.00	0.00
Movement LOS	F	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.27	0.27	0.06	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	81.76	6.69	1.46	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	34.99		0.19		0.00	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]			4.37			
Intersection LOS			F			

Intersection Level Of Service Report
Intersection 1: England Blvd & George Elmer Dr

Control Type: Two-way stop Delay (sec / veh): 65.7
Analysis Method: HCM 7th Edition Level Of Service: F
Analysis Period: 15 minutes Volume to Capacity (v/c): 0.430

Intersection Setup

Name	George Elmer Drive		England Boulevard		England Boulevard	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	George Elmer Drive		England Boulevard		England Boulevard	
Base Volume Input [veh/h]	32	133	160	19	453	270
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	32	133	160	19	453	270
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	36	43	5	123	73
Total Analysis Volume [veh/h]	35	145	174	21	492	293
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.43	0.17	0.00	0.00	0.36	0.00
d_M, Delay for Movement [s/veh]	65.66	25.61	0.00	0.00	8.36	0.00
Movement LOS	F	D	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.62	3.62	0.00	0.00	1.12	1.12
95th-Percentile Queue Length [ft/ln]	90.39	90.39	0.00	0.00	28.02	28.02
d_A, Approach Delay [s/veh]	33.40		0.00		5.24	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]			8.73			
Intersection LOS			F			

Intersection Level Of Service Report
Intersection 2: Mullan Rd & George Elmer Dr

Control Type: Roundabout Delay (sec / veh): 8.9
Analysis Method: HCM 7th Edition Level Of Service: A
Analysis Period: 15 minutes

Intersection Setup

Name	George Elmer Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	George Elmer Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	158	67	29	421	867	241
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	1.60	0.00	0.00	0.10	0.00
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	158	67	29	421	867	241
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	18	8	114	236	65
Total Analysis Volume [veh/h]	172	73	32	458	942	262
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Number of Conflicting Circulating Lanes	1		1		1	
Circulating Flow Rate [veh/h]	943		172		32	
Exiting Flow Rate [veh/h]	294		1017		630	
Demand Flow Rate [veh/h]	158	67	29	421	867	241
Adjusted Demand Flow Rate [veh/h]	172	73	32	458	942	262

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00091	0.00091
HV Adjustment Factor	1.00	0.98	1.00	1.00	1.00	1.00
Entry Flow Rate [veh/h]	172	75	32	458	943	262
Capacity of Entry and Bypass Lanes [veh/h]	603	603	1215	1215	1380	1380
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	603	593	1215	1215	1378	1380
X, volume / capacity	0.29	0.12	0.03	0.38	0.68	0.19

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	B	A				
95th-Percentile Queue Length [veh]	1.17	0.42	0.08	1.78	5.85	0.70				
95th-Percentile Queue Length [ft]	29.36	10.47	2.03	44.58	146.36	17.50				
Approach Delay [s/veh]	9.11		6.41		9.88					
Approach LOS	A		A		A					
Intersection Delay [s/veh]	8.91									
Intersection LOS	A									

Intersection Level Of Service Report
Intersection 3: Mullan Rd & Chuck Wagon Dr

Control Type: Two-way stop Delay (sec / veh): 60.8
Analysis Method: HCM 7th Edition Level Of Service: F
Analysis Period: 15 minutes Volume to Capacity (v/c): 0.495

Intersection Setup

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	Chuck Wagon Drive		Mullan Road		Mullan Road	
Base Volume Input [veh/h]	55	43	64	391	807	117
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	0.00	0.00	0.30	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	55	43	64	391	807	117
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	12	17	106	219	32
Total Analysis Volume [veh/h]	60	47	70	425	877	127
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.49	0.15	0.10	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	60.78	18.40	10.73	0.00	0.00	0.00
Movement LOS	F	C	B	A	A	A
95th-Percentile Queue Length [veh/ln]	2.27	0.52	0.33	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	56.68	12.94	8.33	0.00	0.00	0.00
d_A, Approach Delay [s/veh]		42.17		1.52		0.00
Approach LOS		E		A		A
d_I, Intersection Delay [s/veh]				3.28		
Intersection LOS				F		

WARRANTS

ATTACHMENT

Intelligent Infrastructure.
Enduring Communities.



TURN LANE WARRANTS		Mullan Rd & Chuck Wagon Dr		George Elmer Dr & England Blvd	
		AM	PM	AM	PM
2025	EB Right-Turn Lane				
	EB Left-Turn Lane				
	WB Right-Turn Lane	NO	YES		
	WB Left-Turn Lane				
2030	EB Right-Turn Lane			NO	NO
	EB Left-Turn Lane				
	WB Right-Turn Lane	NO	YES		
	WB Left-Turn Lane			NO	YES

Existing Traffic Volumes (2025) - Right-Turn Lanes at Unsignalized Intersections on 2-Lane Highways

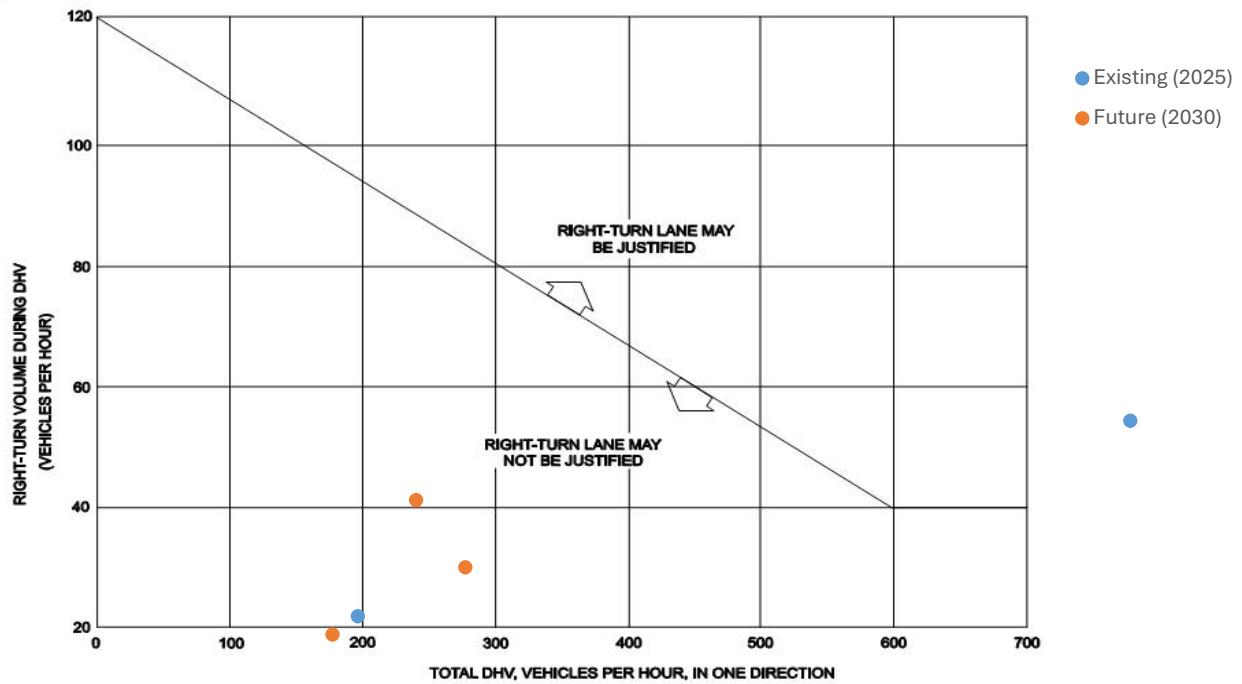
Approach	Time	Total DHV (veh/hr)	Right-Turn Volume During DHV (veh/hr, one direction)	Required Right-Turn Volume for Warranted Lane	Warranted Right- Turn Lane? (Y/N)
Mullan & Chuck Wagon WB	AM weekday	198	22	94	N
	PM weekday	780	54	40	Y

Speed Limit at Approach	Adjustment
45	0
45	0

Future Traffic Volumes (2030) - Right-Turn Lanes at Unsignalized Intersections on 2-Lane Highways

Approach	Time	Total DHV (veh/hr)	Right-Turn Volume During DHV (veh/hr, one direction)	Required Right-Turn Volume for Warranted Lane	Warranted Right- Turn Lane? (Y/N)	Speed Limit at Approach	Adjustment
Mullan & Chuck Wagon WB	AM weekday	242	41	108	N	45	20
	PM weekday	924	117	40	Y	45	0
George Elmer & England EB	AM weekday	279	30	83	N	30	0
	PM weekday	179	19	96	N	30	0

Guidelines for Right-Turn Lanes at Unsignalized Intersections on 2-Lane Highways (Figure 28.4A)



Existing Traffic Volumes (2025) - Left-Turn Lanes at Unsignalized Intersections on 2-Lane Highways

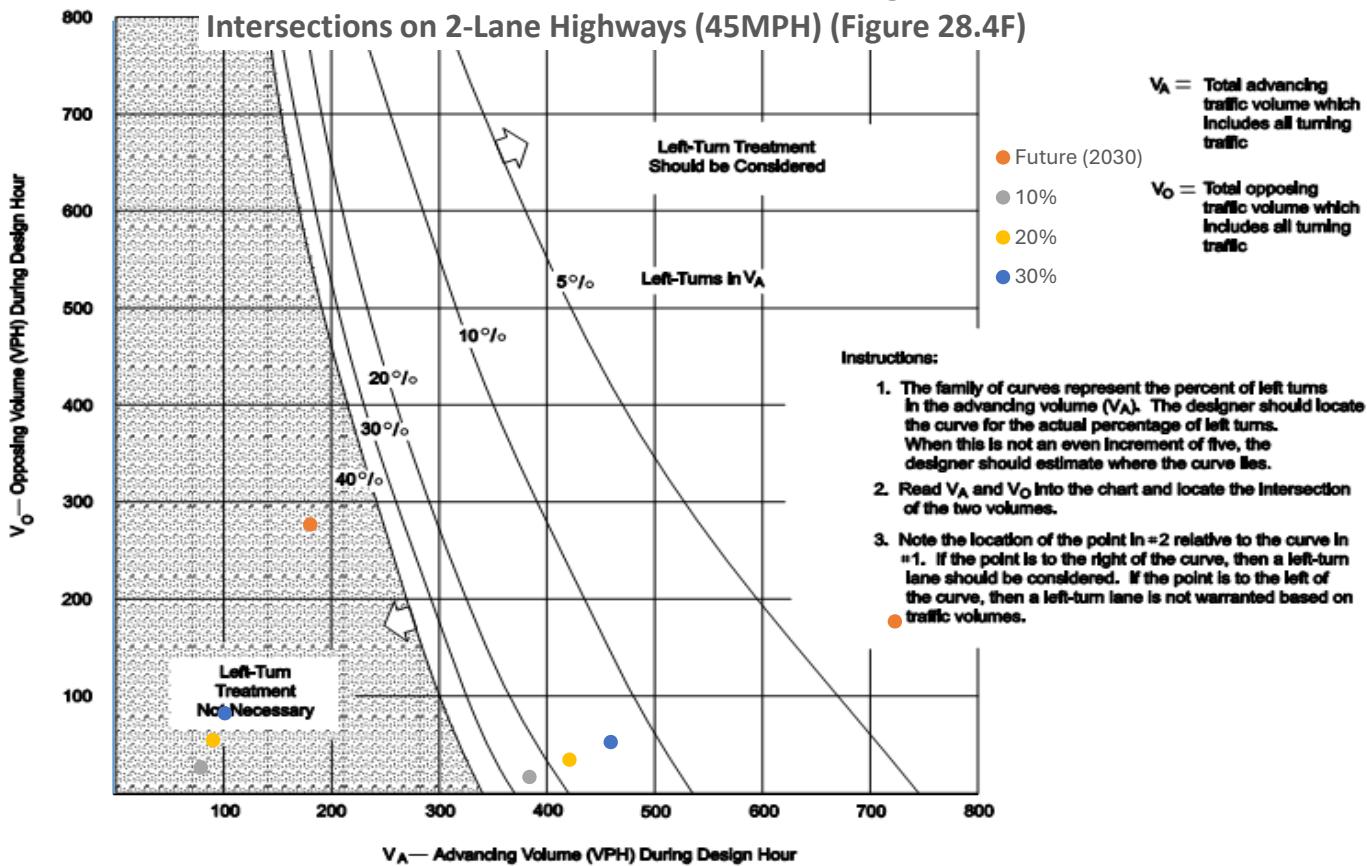
Approach	Time	Va = Total advancing traffic volume	Val = Total left-turn volume in advancing traffic	Percent left-turns in Va	Vo = Total opposing traffic volume	Warranted Left-Turn Lane? (Y/N)	Speed Limit at Approach
Mullan & Chuck Wagon EB	AM weekday	824	7	0.8%	198	N	45
	PM weekday	357	10	2.8%	780	N	45
	AM weekday			#DIV/0!			
	PM weekday			#DIV/0!			
	AM weekday			#DIV/0!			
	PM weekday			#DIV/0!			
	AM weekday			#DIV/0!			
	PM weekday			#DIV/0!			
	AM weekday			#DIV/0!			
	PM weekday			#DIV/0!			

Future Traffic Volumes (2030) - Left-Turn Lanes at Unsignalized Intersections on 2-Lane Highways

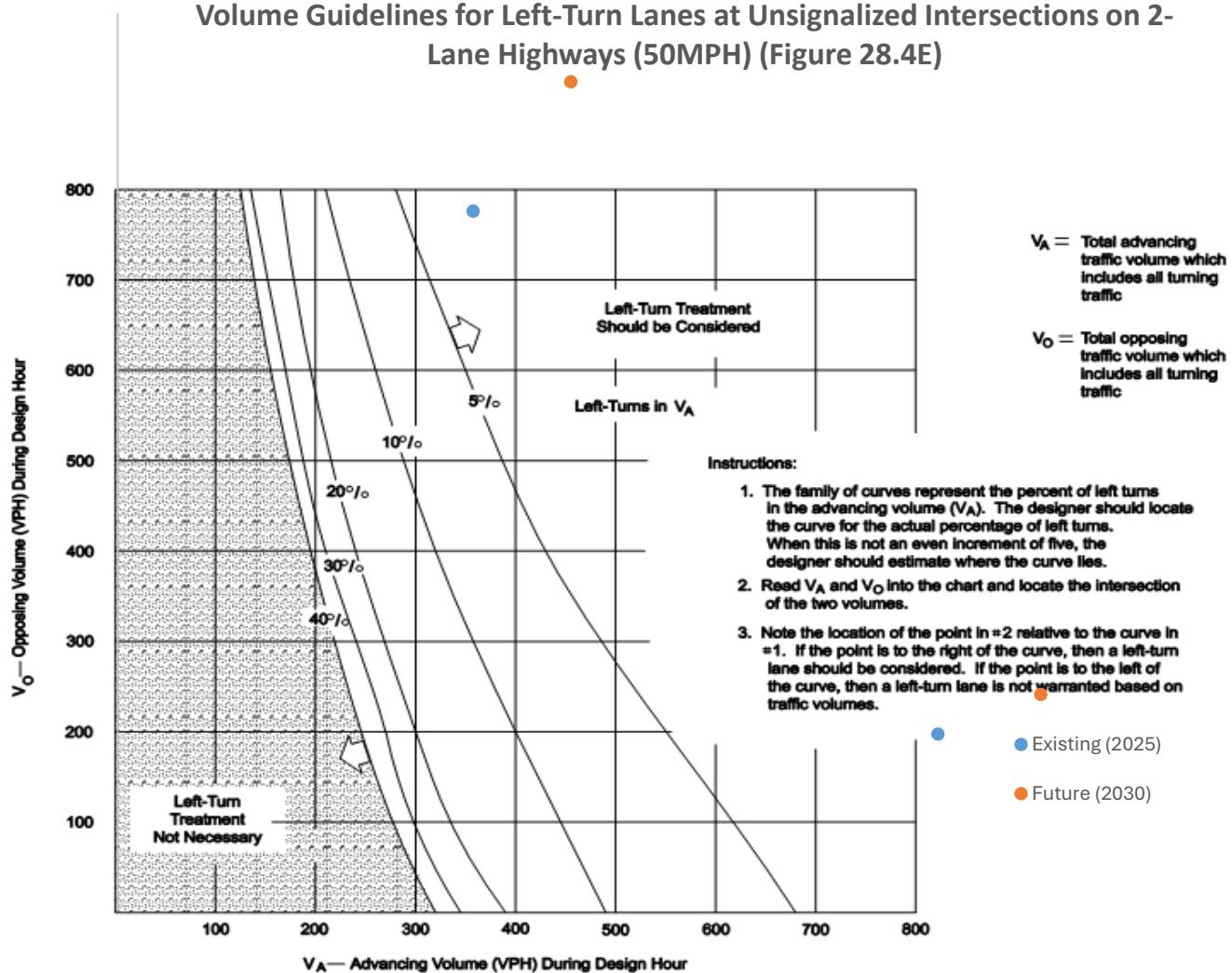
Approach	Time	Va = Total advancing traffic volume	Val = Total left-turn volume in advancing traffic	Percent left-turns in Va	Vo = Total opposing traffic volume	Warranted Left-Turn Lane? (Y/N)	Speed Limit at Approach
Mullan & Chuck Wagon EB	AM weekday	927	23	2.5%	242	Y	45
	PM weekday	455	64	14.1%	924	Y	45
George Elmer & England WB	AM weekday	182	101	55.5%	279	N	30
	PM weekday	723	453	62.7%	179	Y	30
George Elmer & England WB 10%	AM weekday	81	73	90.1%	28		30
	PM weekday	385	358	93.0%	18	Y	30
George Elmer & England WB 20%	AM weekday	92	76	82.6%	56		30
	PM weekday	422	368	87.2%	36	Y	30
George Elmer & England WB 30%	AM weekday	103	79	76.7%	84		30
	PM weekday	460	379	82.4%	54	Y	30

warranted

Volume Guidelines for Left-Turn Lanes at Unsignalized Intersections on 2-Lane Highways (45MPH) (Figure 28.4F)



Volume Guidelines for Left-Turn Lanes at Unsignalized Intersections on 2-Lane Highways (50MPH) (Figure 28.4E)



Warrant 1: Eight-Hour Vehicular Volume

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Existing (2025)

Hour Begin	Avg. Entering Volume				Major Street Total (Both Approaches)	Higher Volume Minor Approach
	NB	SB	EB	WB		
0:00	0	0	0	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00	0	0	0	0	0	0
4:00	0	0	0	0	0	0
5:00	0	0	0	0	0	0
6:00	0	0	0	0	0	0
7:00	0	45	782	155	937	45
8:00	0	52	620	250	870	52
9:00	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	0	0	0	0	0	0
12:00	0	0	0	0	0	0
13:00	0	0	0	0	0	0
14:00	0	0	0	0	0	0
15:00	0	0	0	0	0	0
16:00	0	40	346	699	1045	40
17:00	0	29	358	780	1138	29
18:00	0	0	0	0	0	0
19:00	0	0	0	0	0	0
20:00	0	0	0	0	0	0
21:00	0	0	0	0	0	0
22:00	0	0	0	0	0	0
23:00	0	0	0	0	0	0
TOTAL	0	166	2106	1884	3990	166

Condition A - Minimum Vehicular Volume (70% Columns): Major Street Total > 350 and Higher Minor Street Total > 140 for 8 hours?	Hrs 0
Condition B - Interruption of Continuous Traffic (70% Columns): Major Street Total > 525 and Higher Minor Street Total > 70 for 8 hours?	No 0
Combination of Conditions A & B (56% Columns): Major Street Total > 280 and Higher Minor Street Total > 112 for 8 hours?	No 0
Major Street Total > 420 and Higher Minor Street Total > 56 for 8 hours?	No 0
Warrant 1 Satisfied?	N/A

Warrant 1: Eight-Hour Vehicular Volume

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Future (2030)

Hour Begin	Avg. Entering Volume				Major Street Total (Both Approaches)	Higher Volume Minor Approach
	NB	SB	EB	WB		
0:00	0	0	0	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00	0	0	0	0	0	0
4:00	0	0	0	0	0	0
5:00	0	0	0	0	0	0
6:00	0	0	0	0	0	0
7:00	0	142	915	185	1100	142
8:00	0	164	726	298	1024	164
9:00	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	0	0	0	0	0	0
12:00	0	0	0	0	0	0
13:00	0	0	0	0	0	0
14:00	0	0	0	0	0	0
15:00	0	0	0	0	0	0
16:00	0	126	405	833	1238	126
17:00	0	92	419	930	1349	92
18:00	0	0	0	0	0	0
19:00	0	0	0	0	0	0
20:00	0	0	0	0	0	0
21:00	0	0	0	0	0	0
22:00	0	0	0	0	0	0
23:00	0	0	0	0	0	0
TOTAL	0	524	2465	2246	4711	524

Condition A - Minimum Vehicular Volume (70% Columns): Major Street Total > 350 and Higher Minor Street Total > 140 for 8 hours?	Hrs 2
Condition B - Interruption of Continuous Traffic (70% Columns): Major Street Total > 525 and Higher Minor Street Total > 70 for 8 hours?	No 4
Combination of Conditions A & B (56% Columns): Major Street Total > 280 and Higher Minor Street Total > 112 for 8 hours?	No 3
Major Street Total > 420 and Higher Minor Street Total > 56 for 8 hours?	No 4
Warrant 1 Satisfied?	N/A

Warrant 2: Four-Hour Vehicular Volume

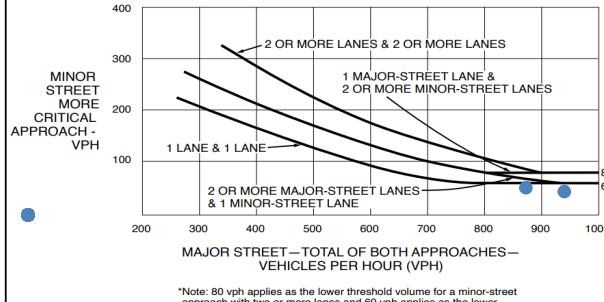
General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Existing (2025)

Hour Begin	Avg. Entering Volume				Major Street Total (Both Approaches)	Higher Volume Minor Approach
	NB	SB	EB	WB		
0:00	0	0	0	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00	0	0	0	0	0	0
4:00	0	0	0	0	0	0
5:00	0	0	0	0	0	0
6:00	0	0	0	0	0	0
7:00	0	45	782	155	937	45
8:00	0	52	620	250	870	52
9:00	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	0	0	0	0	0	0
12:00	0	0	0	0	0	0
13:00	0	0	0	0	0	0
14:00	0	0	0	0	0	0
15:00	0	0	0	0	0	0
16:00	0	40	346	699	1045	40
17:00	0	29	358	780	1138	29
18:00	0	0	0	0	0	0
19:00	0	0	0	0	0	0
20:00	0	0	0	0	0	0
21:00	0	0	0	0	0	0
22:00	0	0	0	0	0	0
23:00	0	0	0	0	0	0
TOTAL	0	166	2106	1884	3990	166

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



Meets warrant criteria on graph for minimum of 4 hours (70% thresholds)?

Warrant 2 Satisfied?

No (0 hrs)

No

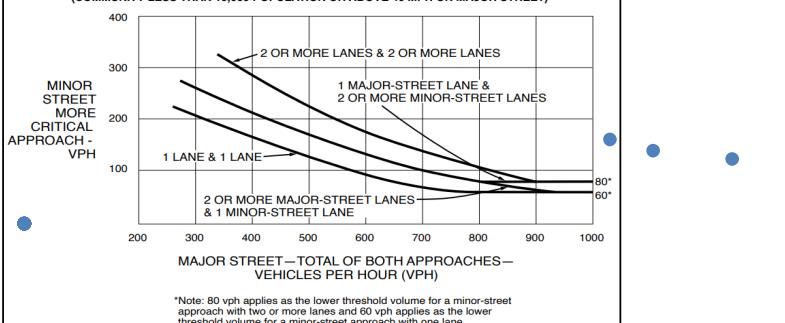
Warrant 2: Four-Hour Vehicular Volume

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Future (2030)

Hour Begin	Avg. Entering Volume				Major Street Total (Both Approaches)	Higher Volume Minor Approach
	NB	SB	EB	WB		
0:00	0	0	0	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00	0	0	0	0	0	0
4:00	0	0	0	0	0	0
5:00	0	0	0	0	0	0
6:00	0	0	0	0	0	0
7:00	0	142	915	185	1100	142
8:00	0	164	726	298	1024	164
9:00	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	0	0	0	0	0	0
12:00	0	0	0	0	0	0
13:00	0	0	0	0	0	0
14:00	0	0	0	0	0	0
15:00	0	0	0	0	0	0
16:00	0	126	405	833	1238	126
17:00	0	92	419	930	1349	92
18:00	0	0	0	0	0	0
19:00	0	0	0	0	0	0
20:00	0	0	0	0	0	0
21:00	0	0	0	0	0	0
22:00	0	0	0	0	0	0
23:00	0	0	0	0	0	0
TOTAL	0	524	2465	2246	4711	524

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



Meets warrant criteria on graph for minimum of 4 hours (100% thresholds)?

Warrant 2 Satisfied?

Yes (4 hrs)

Yes

Warrant 3: Peak Hour

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Existing (2025)

AM Peak Hour 7:00 - 8:00 AM

High Minor Total Stopped Time Delay (hrs)	0.32
Total Volume of Major Approaches (vehs)	1022
High Minor Approach Volume (vehs)	53
Total Entering Volume (vehs)	1075

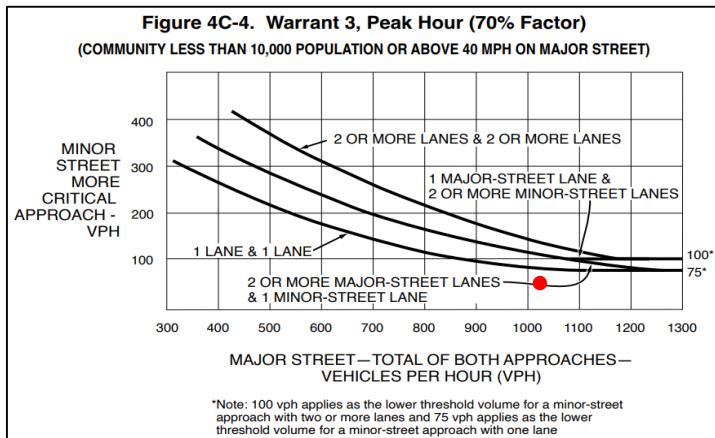
PM Peak Hour 5:00 - 6:00 PM

High Minor Total Stopped Time Delay (hrs)	0.17
Total Volume of Major Approaches (vehs)	1137
High Minor Approach Volume (vehs)	29
Total Entering Volume (vehs)	1166

Category A: Peak Period: AM
 Total stopped time delay for minor approach > 5 veh-hrs? **No (0.32)**
 High minor approach volume > 150 for peak hour? **No (53)**
 Total entering volume > 650 for peak hour? **Yes (1075)**

Category A warrant satisfied? **No**

Category B:



Meets warrant criteria on graph for minimum of one hour (70% thresholds)? **No**

Warrant 3 Satisfied?

No

Warrant 3: Peak Hour

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Future (2030)

AM Peak Hour	7:00 - 8:00 AM
High Minor Total Stopped Time Delay (hrs)	1.57
Total Volume of Major Approaches (vehs)	1169
High Minor Approach Volume (vehs)	161
Total Entering Volume (vehs)	1330

PM Peak Hour	5:00 -6:00 PM
High Minor Total Stopped Time Delay (hrs)	1.15
Total Volume of Major Approaches (vehs)	1379
High Minor Approach Volume (vehs)	98
Total Entering Volume (vehs)	1477

Category A: Peak Period: AM

Total stopped time delay for minor approach > 5 veh-hrs?

No (1.57)

High minor approach volume > 150 for peak hour?

Yes (161)

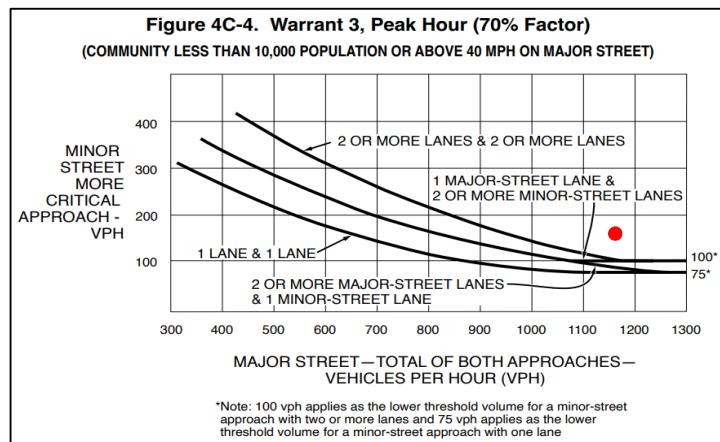
Total entering volume > 650 for peak hour?

Yes (1330)

Category A warrant satisfied?

No

Category B:



Meets warrant criteria on graph for minimum of one hour (70% thresholds)?

Yes

Warrant 3 Satisfied?

Yes

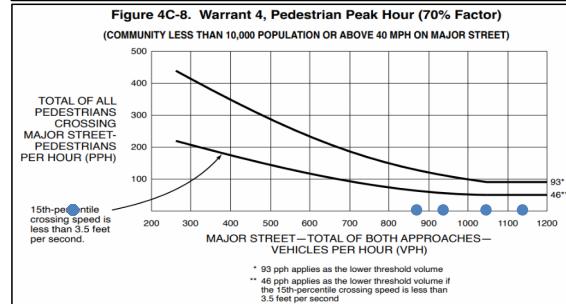
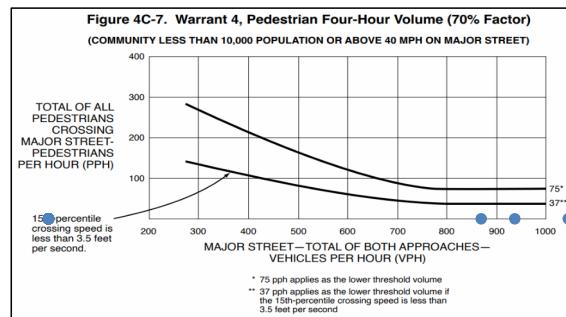
Warrant 4: Pedestrian Volume

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Existing (2025)

This warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

Hour Begin	Major Street Total Traffic	Pedestrian Volume Crossing Major Street
0:00	0	0
1:00	0	0
2:00	0	0
3:00	0	0
4:00	0	0
5:00	0	0
6:00	0	0
7:00	937	0
8:00	870	0
9:00	0	0
10:00	0	0
11:00	0	0
12:00	0	0
13:00	0	0
14:00	0	0
15:00	0	0
16:00	1045	0
17:00	1138	0
18:00	0	0
19:00	0	0
20:00	0	0
21:00	0	0
22:00	0	0
23:00	0	0
TOTAL	3,990	0



For each of any 4 hours of an average day, do the plotted points representing the vehicles per hour on the major street and the corresponding pedestrians per hour crossing the major street fall above the curve in Figure 4C-5? **No**

For 1 hour of an average day, does the plotted point representing vehicles per hour on the major street and the corresponding pedestrians per hour crossing the major street fall above the curve in Figure 4C-6? **No**

Warrant 4 Satisfied?

N/A

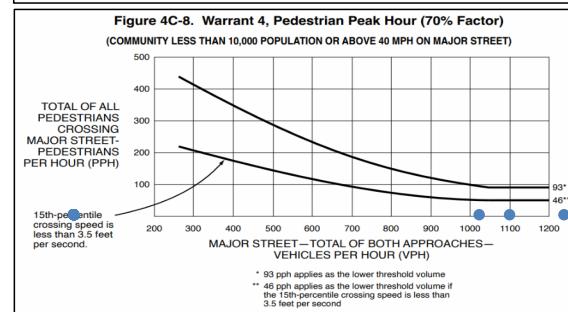
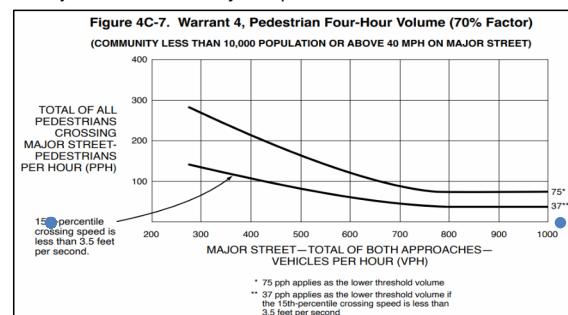
Warrant 4: Pedestrian Volume

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Future (2030)

This warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

Hour Begin	Major Street Total Traffic	Pedestrian Volume Crossing Major Street
0:00	0	0
1:00	0	0
2:00	0	0
3:00	0	0
4:00	0	0
5:00	0	0
6:00	0	0
7:00	1100	0
8:00	1024	0
9:00	0	0
10:00	0	0
11:00	0	0
12:00	0	0
13:00	0	0
14:00	0	0
15:00	0	0
16:00	1238	0
17:00	1349	0
18:00	0	0
19:00	0	0
20:00	0	0
21:00	0	0
22:00	0	0
23:00	0	0
TOTAL	4,711	0



For each of any 4 hours of an average day, do the plotted points representing the vehicles per hour on the major street and the corresponding pedestrians per hour crossing the major street fall above the curve in Figure 4C-5? **No**

For 1 hour of an average day, does the plotted point representing vehicles per hour on the major street and the corresponding pedestrians per hour crossing the major street fall above the curve in Figure 4C-6? **No**

Warrant 4 Satisfied?

N/A

General Information	
Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Existing (2025)
Warrant 5: School Crossing	
This warrant is intended for application where the fact that school children (elementary through high school students) cross the major street is the principle reason to consider installing a traffic signal. This warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless it can be shown that the proposed traffic signal would not restrict the progressive movement of traffic.	
Is the number of adequate gaps in the major crossing traffic stream during the primary crossing period less than the number of minutes in that crossing period?	N/A
Do 20 or more students cross at this location during the highest crossing hour?	No
Warrant 5 Satisfied?	N/A
Warrant 6: Coordinated Signal System	
This warrant is intended for application where installation of a traffic signal would help to provide proper platooning of vehicles and therefore provide progressive movement in a coordinated signal system.	
Are any adjacent traffic signals located so far away that they do not provide a necessary degree of platooning and/or progressive operation?	No
Warrant 6 Satisfied?	N/A
Warrant 7: Crash Experience	
This warrant is intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal	
Have adequate trials of alternatives failed to reduce the crash frequency?	N/A
Have at least one of the following conditions apply to the reported crash history:	
1. Do the number of reported angle crashes and pedestrian crashes within a 1-year period equal or exceed the threshold number in Table 4C-2 for total angle crashes and pedestrian crashes?	
2. Do the number of reported fatal-and-injury angle crashes and pedestrian crashes within a 1-year period equal or exceed the threshold number in Table 4C-2 for total fatal-and-injury angle crashes and pedestrian crashes?	
3. Do the number of reported angle crashes and pedestrian crashes within a 3-year period equal or exceed the threshold number in Table 4C-3 for total angle crashes and pedestrian crashes?	
4. Do the number of reported fatal-and-injury angle crashes and pedestrian crashes within a 3-year period equal or exceed the threshold number in Table 4C-3 for total fatal-and-injury angle crashes and pedestrian crashes?	
	N/A
Is Condition A criterion met for 80% columns of Warrant 1 met?	N/A
Is Condition B criterion met for 80% columns of Warrant 1 met?	N/A
Are observed pedestrian volumes equal to or greater than 80% of what is required for Warrant 4?	No
Warrant 7 Satisfied?	N/A

General Information	
Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Future (2030)
Warrant 5: School Crossing	
This warrant is intended for application where the fact that school children (elementary through high school students) cross the major street is the principle reason to consider installing a traffic signal. This warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless it can be shown that the proposed traffic signal would not restrict the progressive movement of traffic.	
Is the number of adequate gaps in the major crossing traffic stream during the primary crossing period less than the number of minutes in that crossing period?	N/A
Do 20 or more students cross at this location during the highest crossing hour?	No
Warrant 5 Satisfied?	N/A
Warrant 6: Coordinated Signal System	
This warrant is intended for application where installation of a traffic signal would help to provide proper platooning of vehicles and therefore provide progressive movement in a coordinated signal system.	
Are any adjacent traffic signals located so far away that they do not provide a necessary degree of platooning and/or progressive operation?	No
Warrant 6 Satisfied?	N/A
Warrant 7: Crash Experience	
This warrant is intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal	
Have adequate trials of alternatives failed to reduce the crash frequency?	N/A
Have at least one of the following conditions apply to the reported crash history:	
1. Do the number of reported angle crashes and pedestrian crashes within a 1-year period equal or exceed the threshold number in Table 4C-2 for total angle crashes and pedestrian crashes?	
2. Do the number of reported fatal-and-injury angle crashes and pedestrian crashes within a 1-year period equal or exceed the threshold number in Table 4C-2 for total fatal-and-injury angle crashes and pedestrian crashes?	
3. Do the number of reported angle crashes and pedestrian crashes within a 3-year period equal or exceed the threshold number in Table 4C-3 for total angle crashes and pedestrian crashes?	
4. Do the number of reported fatal-and-injury angle crashes and pedestrian crashes within a 3-year period equal or exceed the threshold number in Table 4C-3 for total fatal-and-injury angle crashes and pedestrian crashes?	
	N/A
Is Condition A criterion met for 80% columns of Warrant 1 met?	N/A
Is Condition B criterion met for 80% columns of Warrant 1 met?	N/A
Are observed pedestrian volumes equal to or greater than 80% of what is required for Warrant 4?	No
Warrant 7 Satisfied?	N/A

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Existing (2025)

Warrant 8: Roadway Network

This warrant is intended for application where installation of a traffic signal could be justified in order to encourage concentration and organization of traffic flow on a roadway network

Do two or more of the intersecting routes at this location have at least one of the following characteristics:

- A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow; or
- B. It includes rural or suburban highways outside, entering, or traversing a City; or
- C. It appears as a major route on an official plan.

No

Does this intersection have an existing or immediately projected total entering volume of at least 1000 vehicles during a weekday typical peak hour and have a 5-year projected traffic volume that meets one or more of Warrants 1, 2, and 3 during an average weekday?

Yes

Does this intersection have an existing or immediately projected total entering volume of at least 1000 vph for each of any 5 hours of a Saturday or Sunday?

N/A

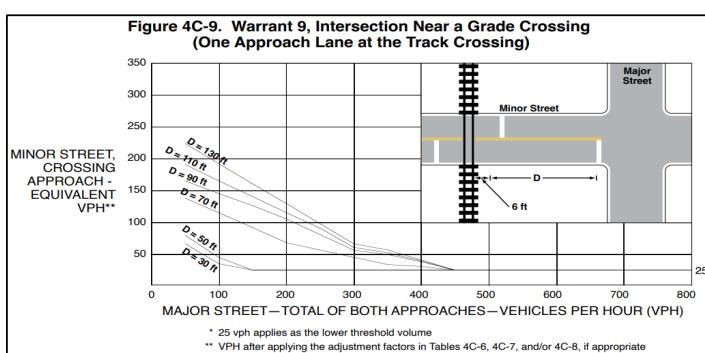
Warrant 8 Satisfied? **No**

Warrant 9: Intersection Near a Grade Crossing

This warrant is intended for application where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic signal.

Does a grade crossing exist on an approach controlled by a STOP or YIELD sign whereby the center of the track nearest to the intersection is within 140 feet of the stop or yield line?

No



During the highest traffic volume hour during which the rail traffic uses the crossing, does the plotted point representing vehicles per hour on the major street and the corresponding vehicles per hour on the minor-street approach that crosses the track fall above the applicable curve in Figure 4C-9 or 4C-10 (whichever is applicable) for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance?

N/A

Warrant 9 Satisfied? **N/A**

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	Mullan Rd (1 lane)
Minor Street (Approach Lanes):	Chuck Wagon Dr (2 lanes)
Analysis Year/Case:	Future (2030)

Warrant 8: Roadway Network

This warrant is intended for application where installation of a traffic signal could be justified in order to encourage concentration and organization of traffic flow on a roadway network

Do two or more of the intersecting routes at this location have at least one of the following characteristics:

- A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow; or
- B. It includes rural or suburban highways outside, entering, or traversing a City; or
- C. It appears as a major route on an official plan.

No

Does this intersection have an existing or immediately projected total entering volume of at least 1000 vehicles during a weekday typical peak hour and have a 5-year projected traffic volume that meets one or more of Warrants 1, 2, and 3 during an average weekday?

Yes

Does this intersection have an existing or immediately projected total entering volume of at least 1000 vph for each of any 5 hours of a Saturday or Sunday?

N/A

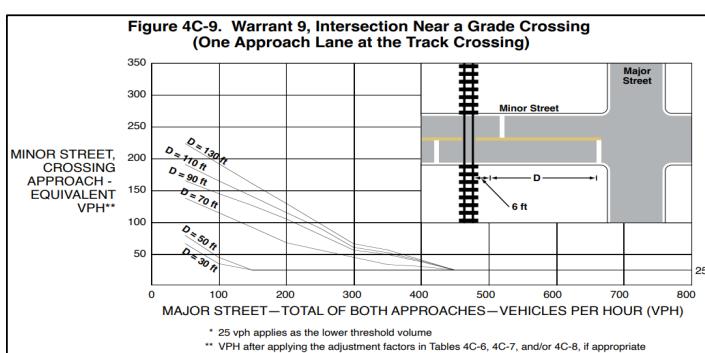
Warrant 8 Satisfied? **No**

Warrant 9: Intersection Near a Grade Crossing

This warrant is intended for application where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic signal.

Does a grade crossing exist on an approach controlled by a STOP or YIELD sign whereby the center of the track nearest to the intersection is within 140 feet of the stop or yield line?

No



During the highest traffic volume hour during which the rail traffic uses the crossing, does the plotted point representing vehicles per hour on the major street and the corresponding vehicles per hour on the minor-street approach that crosses the track fall above the applicable curve in Figure 4C-9 or 4C-10 (whichever is applicable) for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance?

N/A

Warrant 9 Satisfied? **N/A**

Warrant 3: Peak Hour

General Information

Agency/Company:	Sanbell
Date:	2/20/2025
Project Number:	250155
Project Description:	Paisley Park
Jurisdiction:	City of Missoula
Major Street Speed Limit:	45 mph
Major Street (Approach Lanes):	England Blvd (1 lane)
Minor Street (Approach Lanes):	George Elmer Dr (1 lane)
Analysis Year/Case:	Future (2030)

AM Peak Hour 7:00 - 8:00 AM

High Minor Total Stopped Time Delay (hrs)	1.53
Total Volume of Major Approaches (vehs)	461
High Minor Approach Volume (vehs)	360
Total Entering Volume (vehs)	821

PM Peak Hour 5:00 -6:00 PM

High Minor Total Stopped Time Delay (hrs)	1.53
Total Volume of Major Approaches (vehs)	902
High Minor Approach Volume (vehs)	165
Total Entering Volume (vehs)	1067

Category A:

Peak Period: PM

Total stopped time delay for minor approach > 4 veh-hrs?

No (1.53)

High minor approach volume > 100 for peak hour?

Yes (165)

Total entering volume > 650 for peak hour?

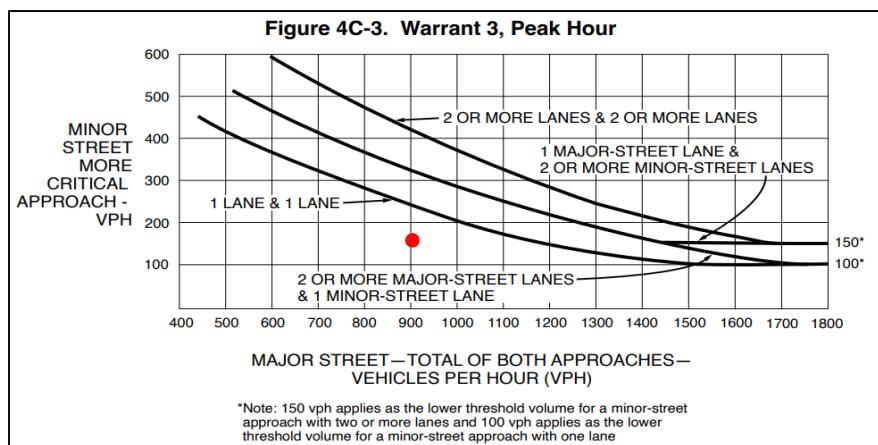
Yes (1067)

Category A warrant satisfied?

No

Category B:

Figure 4C-3. Warrant 3, Peak Hour



Meets warrant criteria on graph for minimum of one hour (100% thresholds)?

No

Warrant 3 Satisfied?

No

CAPACITY CALCULATIONS – FUTURE IMPROVED (2030)

ATTACHMENT F

Intelligent Infrastructure.
Enduring Communities.



Intersection	Approach	Future with Improvements (2030)					
		AM Peak			PM Peak		
		Avg Delay (s/veh)	LOS	95th % Queue (veh)	Avg Delay (s/veh)	LOS	95th % Queue (veh)
Intersection Control		One-Way Stop-Control (NB), WB Left-Turn Lane					
England Blvd & George Elmer Dr	NB	15.3	C	4	28.9	D	4
	EB	0.0	A	0	0.0	A	0
	WB	4.5	A	1	5.7	A	2
	Intersection	7.7	A	--	8.3	A	--
Intersection Control		One-Way Stop-Control (NB), WB LT, NB LT & RT Lanes					
England Blvd & George Elmer Dr	NB	14.6	B	3	21.2	C	2
	EB	0.0	A	0	0.0	A	0
	WB	4.5	A	1	5.7	A	2
	Intersection	7.4	A	--	7.1	A	--
Intersection Control		All-Way Stop-Control					
England Blvd & George Elmer Dr	NB	12.5	B	3	11.0	B	2
	EB	12.2	B	3	10.5	B	2
	WB	10.9	B	2	73.9	F	21
	Intersection	12.0	B	--	53.5	F	--
Intersection Control		Roundabout					
England Blvd & George Elmer Dr	NB	7.6	A	2	4.6	A	1
	EB	5.3	A	1	7.0	A	1
	WB	3.9	A	1	9.8	A	5
	Intersection	6.0	A	--	8.6	A	--
Intersection Control		One-Way Stop-Control (SB), WB Right-Turn Lane					
Mullan Rd & Chuck Wagon Dr	SB	33.2	D	4	37.2	E	3
	EB	0.2	A	1	1.5	A	1
	WB	0.0	A	0	0.0	A	0
	Intersection	4.2	A	--	2.9	A	--
Intersection Control		Signalized					
Mullan Rd & Chuck Wagon Dr	SB	16.2	B	2	18.9	B	1
	EB	8.0	A	2	4.1	A	1
	WB	2.7	A	1	6.0	A	2
	Intersection	8.0	A	--	6.3	A	--
Intersection Control		Roundabout					
Mullan Rd & Chuck Wagon Dr	SB	3.8	A	1	6.8	A	1
	EB	15.5	C	9	5.2	A	2
	WB	4.5	A	1	16.0	C	9
	Intersection	12.1	B	--	12.0	B	--

Option 1: WB Left-Turn Lane

Number	1					
Intersection	England Blvd & George Elmer Dr					
Control Type	Two-way stop					
Analysis Method	HCM 7th Edition					
Name	George Elmer Drive	England Boulevard	England Boulevard			
Approach	Northbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	32	133	160	19	453	270
Total Analysis Volume [veh/h]	35	145	174	21	492	293

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Capacity Analysis

Calculated Rank	3	2	1	1	2	1
v_c, Conflicting Flow Rate	1462	185	0	0	195	0
v_c, Stage 1	185	185	0	0	195	0
v_c, Stage 2	1277	0	0	0	0	0
c_p,x, Potential Capacity [veh/h]	142	858	0	0	1378	0
c_p,x, Stage 1 [veh/h]	847	1179	0	0	1721	0
c_p,x, Stage 2 [veh/h]	262	1085	0	0	1623	0
c_m,x, Movement Capacity [veh/h]	91	858	100000	100000	1378	100000
c_m,x, Stage 1 [veh/h]	0	0	0	0	0	0
c_m,x, Stage 2 [veh/h]	0	0	0	0	0	0
c_T, Total Capacity [veh/h]	91	858	100000	100000	1378	100000

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.38	0.17	0.00	0.00	0.36	0.00
d_M, Delay for Movement [s/veh]	57.31	22.04	0.00	0.00	9.06	0.00
Movement LOS	F	C	A	A	A	A
Critical Movement	Yes	No	No	No	No	No
95th-Percentile Queue Length [veh/ln]	3.16	3.16	0.00	0.00	1.64	0.00
95th-Percentile Queue Length [ft/ln]	78.98	78.98	0.00	0.00	41.04	0.00
d_A, Approach Delay [s/veh]	28.90		0.00		5.68	
Approach LOS	D		A		A	
V/C_I, Worst Movement V/C Ratio			0.38			
d_I, Worst Movement Control Delay [s/veh]			57.31			
d_I, Intersection Delay [s/veh]			8.32			
Intersection LOS			F			

Option 2: All-Way Stop Control

Number	1				
Intersection	England Blvd & George Elmer Dr				
Control Type	All-way stop				
Analysis Method	HCM 7th Edition				
Name	George Elmer Drive	England Boulevard	England Boulevard		
Approach	Northbound	Eastbound	Westbound		
Lane Configuration					
Turning Movement	Left	Right	Thru	Right	Left
Base Volume Input [veh/h]	32	133	160	19	453
Total Analysis Volume [veh/h]	35	145	174	21	492
					293

Intersection Settings**Lanes**

Capacity per Entry Lane [veh/h]	630	677	785
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Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	10.98	10.46	73.94
95th-Percentile Queue Length [veh]	1.18	1.19	20.54
95th-Percentile Queue Length [ft]	29.38	29.78	513.59
Approach Delay [s/veh]	10.98	10.46	73.94
Approach LOS	B	B	F
Intersection Delay [s/veh]		53.50	
Intersection LOS		F	

Option 3: WB LT Lane and NB L and RT Lanes

Number	1					
Intersection	England Blvd & George Elmer Dr					
Control Type	Two-way stop					
Analysis Method	HCM 7th Edition					
Name	George Elmer Drive	England Boulevard	England Boulevard			
Approach	Northbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	32	133	160	19	453	270
Total Analysis Volume [veh/h]	35	145	174	21	492	293

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Capacity Analysis

Calculated Rank	3	2	1	1	2	1
v_c, Conflicting Flow Rate	1462	185	0	0	195	0
v_c, Stage 1	185	185	0	0	195	0
v_c, Stage 2	1277	0	0	0	0	0
c_p,x, Potential Capacity [veh/h]	142	858	0	0	1378	0
c_p,x, Stage 1 [veh/h]	847	1179	0	0	1721	0
c_p,x, Stage 2 [veh/h]	262	1085	0	0	1623	0
c_m,x, Movement Capacity [veh/h]	91	858	100000	100000	1378	100000
c_m,x, Stage 1 [veh/h]	0	0	0	0	0	0
c_m,x, Stage 2 [veh/h]	0	0	0	0	0	0
c_T, Total Capacity [veh/h]	91	858	100000	100000	1378	100000

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.38	0.17	0.00	0.00	0.36	0.00				
d_M, Delay for Movement [s/veh]	67.17	10.05	0.00	0.00	9.06	0.00				
Movement LOS	F	B	A	A	A	A				
Critical Movement	Yes	No	No	No	No	No				
95th-Percentile Queue Length [veh/ln]	1.53	0.61	0.00	0.00	1.64	0.00				
95th-Percentile Queue Length [ft/ln]	38.33	15.15	0.00	0.00	41.04	0.00				
d_A, Approach Delay [s/veh]	21.16		0.00		5.68					
Approach LOS	C		A		A					
V/C_I, Worst Movement V/C Ratio	0.38									
d_I, Worst Movement Control Delay [s/veh]	67.17									
d_I, Intersection Delay [s/veh]	7.12									
Intersection LOS	F									

Option 4: Roundabout

Number	1					
Intersection	England Blvd & George Elmer Dr					
Control Type	Roundabout					
Analysis Method	HCM 7th Edition					
Name	George Elmer Drive	England Boulevard	England Boulevard			
Approach	Northbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	32	133	160	19	453	270
Total Analysis Volume [veh/h]	35	145	174	21	492	293

Intersection Settings

Number of Conflicting Circulating Lanes	1	1	1
Circulating Flow Rate [veh/h]	177	502	36
Exiting Flow Rate [veh/h]	523	335	325
Demand Flow Rate [veh/h]	32	133	160
Adjusted Demand Flow Rate [veh/h]	35	145	174
		21	21
		492	293

Lanes

Overwrite Calculated Critical Headway	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1380.00
B (coefficient)	0.00102	0.00102	0.00102
HV Adjustment Factor	0.98	0.98	0.98
Entry Flow Rate [veh/h]	184	199	801
Capacity of Entry and Bypass Lanes [veh/h]	1152	828	1331
Pedestrian Impedance	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1129	811	1305
X, volume / capacity	0.16	0.24	0.60

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	4.59	7.04	9.84
Lane LOS	A	A	A
95th-Percentile Queue Length [veh]	0.57	0.94	4.25
95th-Percentile Queue Length [ft]	14.16	23.46	106.35
Approach Delay [s/veh]	4.59	7.04	9.84
Approach LOS	A	A	A
Intersection Delay [s/veh]		8.56	
Intersection LOS		A	

Option 1: WB Right-Turn Lane

Number	3					
Intersection	Mullan Rd & Chuck Wagon Dr					
Control Type	Two-way stop					
Analysis Method	HCM 7th Edition					
Name	Chuck Wagon Drive	Mullan Road	Mullan Road			
Approach	Southbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Base Volume Input [veh/h]	55	43	64	391	807	117
Total Analysis Volume [veh/h]	60	47	70	425	877	127

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Capacity Analysis

Calculated Rank	3	2	2	1	1	1
v_c, Conflicting Flow Rate	1442	877	1004	0	0	0
v_c, Stage 1	877	877	1004	0	0	0
v_c, Stage 2	565	0	0	0	0	0
c_p,x, Potential Capacity [veh/h]	147	343	698	0	0	0
c_p,x, Stage 1 [veh/h]	410	1555	2189	0	0	0
c_p,x, Stage 2 [veh/h]	573	1076	1636	0	0	0
c_m,x, Movement Capacity [veh/h]	133	343	698	100000	100000	100000
c_m,x, Stage 1 [veh/h]	0	0	0	0	0	0
c_m,x, Stage 2 [veh/h]	0	0	0	0	0	0
c_T, Total Capacity [veh/h]	133	343	698	100000	100000	100000

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.45	0.14	0.10	0.00	0.01	0.00				
d_M, Delay for Movement [s/veh]	52.87	17.14	10.73	0.00	0.00	0.00				
Movement LOS	F	C	B	A	A	A				
Critical Movement	Yes	No	No	No	No	No				
95th-Percentile Queue Length [veh/ln]	2.03	0.47	0.33	0.00	0.00	0.00				
95th-Percentile Queue Length [ft/ln]	50.69	11.75	8.33	0.00	0.00	0.00				
d_A, Approach Delay [s/veh]	37.18		1.52		0.00					
Approach LOS	E		A		A					
V/C_I, Worst Movement V/C Ratio	0.45									
d_I, Worst Movement Control Delay [s/veh]	52.87									
d_I, Intersection Delay [s/veh]	2.94									
Intersection LOS	F									

Option 2: Signalized

Number	3					
Intersection	Mullan Rd & Chuck Wagon Dr					
Control Type	Signalized					
Analysis Method	HCM 7th Edition					
Name	Chuck Wagon Drive	Mullan Road	Mullan Road			
Approach	Southbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Base Volume Input [veh/h]	55	43	64	391	807	117
Total Analysis Volume [veh/h]	60	47	70	425	877	127

Intersection Settings

Cycle Length [s]	90					
Active Pattern	Free Running					
Coordination Type	Free Running					
Actuation Type	Fully actuated					
Lost time [s]	0.00					
Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	7	0	0	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	0	10	10	0
Maximum Green [s]	20	0	0	60	60	0
Amber [s]	3.0	0.0	0.0	3.0	3.0	0.0
All red [s]	1.0	0.0	0.0	1.0	1.0	0.0
Split [s]	9	0	0	14	14	0
Walk [s]	7	0	0	7	7	0
Pedestrian Clearance [s]	12	0	0	12	12	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
I1, Start-Up Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
Minimum Recall	No			No	No	
Maximum Recall	No			No	No	
Pedestrian Recall	No			No	No	
Pedestrian Signal Group				0		
Pedestrian Walk [s]				0		
Pedestrian Clearance [s]				0		

Lane Group Calculations

g / C, Green / Cycle	0.09	0.09	0.71	0.71	0.71
(v / s)_i Volume / Saturation Flow Rate	0.04	0.03	0.14	0.25	0.60
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900
Arrival type	3		3		3
s, saturation flow rate [veh/h]	1629	1396	513	1710	1669
c, Capacity [veh/h]	142	122	292	1211	1182
X, volume / capacity	0.42	0.39	0.24	0.35	0.85
d, Delay for Lane Group [s/veh]	18.90	18.85	14.55	2.39	5.99
-	-	-	-	-	-

Lane Group LOS	B	B	B	A	A
Critical Lane Group	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.52	0.41	0.47	0.06	0.59
50th-Percentile Queue Length [ft/ln]	12.96	10.27	11.82	1.46	14.85
95th-Percentile Queue Length [veh/ln]	0.93	0.74	0.85	0.11	1.07
95th-Percentile Queue Length [ft/ln]	23.32	18.49	21.28	2.63	26.73

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	18.90	18.85	14.55	2.39	5.99	5.99
Movement LOS	B	B	B	A	A	A
Critical Movement	Yes	No	No	No	No	No
d_A, Approach Delay [s/veh]	18.88		4.11		5.99	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]			6.27			
Intersection LOS			A			
Intersection V/C			0.639			

Option 3: Roundabout

Number	3					
Intersection	Mullan Rd & Chuck Wagon Dr					
Control Type	Roundabout					
Analysis Method	HCM 7th Edition					
Name	Chuck Wagon Drive	Mullan Road	Mullan Road			
Approach	Southbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Base Volume Input [veh/h]	100	61	23	904	201	41
Total Analysis Volume [veh/h]	109	66	25	983	218	45

Intersection Settings

Number of Conflicting Circulating Lanes	1	1	1	
Circulating Flow Rate [veh/h]	230	109	25	
Exiting Flow Rate [veh/h]	70	296	1109	
Demand Flow Rate [veh/h]	100	61	904	201
Adjusted Demand Flow Rate [veh/h]	109	66	983	218

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1380.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00102
HV Adjustment Factor	1.00	1.00	1.00	0.98	0.96
Entry Flow Rate [veh/h]	109	66	25	1000	276
Capacity of Entry and Bypass Lanes [veh/h]	1152	1152	1286	1286	1346
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1152	1152	1286	1265	1286
X, volume / capacity	0.09	0.06	0.02	0.78	0.20

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	3.93	3.60	2.95	15.85	4.54
Lane LOS	A	A	A	C	A
95th-Percentile Queue Length [veh]	0.31	0.18	0.06	8.45	0.77
95th-Percentile Queue Length [ft]	7.82	4.55	1.49	211.24	19.19
Approach Delay [s/veh]	3.80		15.53		4.54
Approach LOS	A		C		A
Intersection Delay [s/veh]			12.11		
Intersection LOS			B		

Option 1: WB Left-Turn Lane

Number	1					
Intersection	England Blvd & George Elmer Dr					
Control Type	Two-way stop					
Analysis Method	HCM 7th Edition					
Name	George Elmer Drive	England Boulevard	England Boulevard			
Approach	Northbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	9	351	249	30	101	81
Total Analysis Volume [veh/h]	10	382	271	33	110	88

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Capacity Analysis

Calculated Rank	3	2	1	1	2	1
v_c, Conflicting Flow Rate	596	288	0	0	304	0
v_c, Stage 1	288	288	0	0	304	0
v_c, Stage 2	308	0	0	0	0	0
c_p,x, Potential Capacity [veh/h]	467	752	0	0	1257	0
c_p,x, Stage 1 [veh/h]	761	1233	0	0	1777	0
c_p,x, Stage 2 [veh/h]	745	1085	0	0	1623	0
c_m,x, Movement Capacity [veh/h]	426	752	100000	100000	1257	100000
c_m,x, Stage 1 [veh/h]	0	0	0	0	0	0
c_m,x, Stage 2 [veh/h]	0	0	0	0	0	0
c_T, Total Capacity [veh/h]	426	752	100000	100000	1257	100000

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.51	0.00	0.00	0.09	0.00				
d_M, Delay for Movement [s/veh]	18.86	15.20	0.00	0.00	8.14	0.00				
Movement LOS	C	C	A	A	A	A				
Critical Movement	Yes	No	No	No	No	No				
95th-Percentile Queue Length [veh/ln]	3.17	3.17	0.00	0.00	0.29	0.00				
95th-Percentile Queue Length [ft/ln]	79.34	79.34	0.00	0.00	7.18	0.00				
d_A, Approach Delay [s/veh]	15.29		0.00		4.52					
Approach LOS	C		A		A					
V/C_I, Worst Movement V/C Ratio	0.02									
d_I, Worst Movement Control Delay [s/veh]	18.86									
d_I, Intersection Delay [s/veh]	7.71									
Intersection LOS	C									

Option 2: All-Way Stop Control

Number	1				
Intersection	England Blvd & George Elmer Dr				
Control Type	All-way stop				
Analysis Method	HCM 7th Edition				
Name	George Elmer Drive	England Boulevard	England Boulevard		
Approach	Northbound	Eastbound	Westbound		
Lane Configuration					
Turning Movement	Left	Right	Thru	Right	Left
Base Volume Input [veh/h]	9	351	249	30	101
Total Analysis Volume [veh/h]	10	382	271	33	110
					88

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	769	695	654
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Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	12.45	12.15	10.87
95th-Percentile Queue Length [veh]	2.94	2.23	1.27
95th-Percentile Queue Length [ft]	73.44	55.80	31.83
Approach Delay [s/veh]	12.45	12.15	10.87
Approach LOS	B	B	B
Intersection Delay [s/veh]		12.00	
Intersection LOS		B	

Option 3: WB LT Lane and NB L and RT Lanes

Number	1					
Intersection	England Blvd & George Elmer Dr					
Control Type	Two-way stop					
Analysis Method	HCM 7th Edition					
Name	George Elmer Drive	England Boulevard	England Boulevard			
Approach	Northbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	9	351	249	30	101	81
Total Analysis Volume [veh/h]	10	382	271	33	110	88

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Capacity Analysis

Calculated Rank	3	2	1	1	2	1
v_c, Conflicting Flow Rate	596	288	0	0	304	0
v_c, Stage 1	288	288	0	0	304	0
v_c, Stage 2	308	0	0	0	0	0
c_p,x, Potential Capacity [veh/h]	467	752	0	0	1257	0
c_p,x, Stage 1 [veh/h]	761	1233	0	0	1777	0
c_p,x, Stage 2 [veh/h]	745	1085	0	0	1623	0
c_m,x, Movement Capacity [veh/h]	426	752	100000	100000	1257	100000
c_m,x, Stage 1 [veh/h]	0	0	0	0	0	0
c_m,x, Stage 2 [veh/h]	0	0	0	0	0	0
c_T, Total Capacity [veh/h]	426	752	100000	100000	1257	100000

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.51	0.00	0.00	0.09	0.00				
d_M, Delay for Movement [s/veh]	13.66	14.64	0.00	0.00	8.14	0.00				
Movement LOS	B	B	A	A	A	A				
Critical Movement	No	Yes	No	No	No	No				
95th-Percentile Queue Length [veh/ln]	0.07	2.92	0.00	0.00	0.29	0.00				
95th-Percentile Queue Length [ft/ln]	1.80	72.92	0.00	0.00	7.18	0.00				
d_A, Approach Delay [s/veh]	14.61		0.00		4.52					
Approach LOS	B		A		A					
V/C_I, Worst Movement V/C Ratio	0.51									
d_I, Worst Movement Control Delay [s/veh]	14.64									
d_I, Intersection Delay [s/veh]	7.41									
Intersection LOS	B									

Option 4: Roundabout

Number	1					
Intersection	England Blvd & George Elmer Dr					
Control Type	Roundabout					
Analysis Method	HCM 7th Edition					
Name	George Elmer Drive	England Boulevard	England Boulevard			
Approach	Northbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	9	351	249	30	101	81
Total Analysis Volume [veh/h]	10	382	271	33	110	88

Intersection Settings

Number of Conflicting Circulating Lanes	1	1	1
Circulating Flow Rate [veh/h]	276	112	10
Exiting Flow Rate [veh/h]	146	100	666
Demand Flow Rate [veh/h]	9	351	249
Adjusted Demand Flow Rate [veh/h]	10	382	271
		33	30
		110	101
		88	81

Lanes

Overwrite Calculated Critical Headway	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00
A (intercept)	1380.00	1380.00	1380.00
B (coefficient)	0.00102	0.00102	0.00102
HV Adjustment Factor	0.98	0.98	0.98
Entry Flow Rate [veh/h]	400	311	202
Capacity of Entry and Bypass Lanes [veh/h]	1041	1231	1366
Pedestrian Impedance	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1021	1207	1339
X, volume / capacity	0.38	0.25	0.15

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	7.63	5.25	3.89
Lane LOS	A	A	A
95th-Percentile Queue Length [veh]	1.83	1.00	0.52
95th-Percentile Queue Length [ft]	45.71	25.04	12.97
Approach Delay [s/veh]	7.63	5.25	3.89
Approach LOS	A	A	A
Intersection Delay [s/veh]		5.99	
Intersection LOS		A	

Option 1: WB RT Lane

Number	3					
Intersection	Mullan Rd & Chuck Wagon Dr					
Control Type	Two-way stop					
Analysis Method	HCM 7th Edition					
Name	Chuck Wagon Drive	Mullan Road	Mullan Road			
Approach	Southbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Base Volume Input [veh/h]	100	61	23	904	201	41
Total Analysis Volume [veh/h]	109	66	25	983	218	45

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Capacity Analysis

Calculated Rank	3	2	2	1	1	1
v_c, Conflicting Flow Rate	1251	218	263	0	0	0
v_c, Stage 1	218	218	263	0	0	0
v_c, Stage 2	1033	0	0	0	0	0
c_p,x, Potential Capacity [veh/h]	192	827	1313	0	0	0
c_p,x, Stage 1 [veh/h]	823	1204	1771	0	0	0
c_p,x, Stage 2 [veh/h]	346	1091	1636	0	0	0
c_m,x, Movement Capacity [veh/h]	189	827	1313	100000	100000	100000
c_m,x, Stage 1 [veh/h]	0	0	0	0	0	0
c_m,x, Stage 2 [veh/h]	0	0	0	0	0	0
c_T, Total Capacity [veh/h]	189	827	1313	100000	100000	100000

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.58	0.08	0.02	0.01	0.00	0.00				
d_M, Delay for Movement [s/veh]	47.36	9.73	7.80	0.00	0.00	0.00				
Movement LOS	E	A	A	A	A	A				
Critical Movement	Yes	No	No	No	No	No				
95th-Percentile Queue Length [veh/ln]	3.13	0.26	0.06	0.00	0.00	0.00				
95th-Percentile Queue Length [ft/ln]	78.13	6.49	1.46	0.00	0.00	0.00				
d_A, Approach Delay [s/veh]	33.17		0.19		0.00					
Approach LOS	D		A		A					
V/C_I, Worst Movement V/C Ratio	0.58									
d_I, Worst Movement Control Delay [s/veh]	47.36									
d_I, Intersection Delay [s/veh]	4.15									
Intersection LOS	E									

Option 2: Signalized

Number	3					
Intersection	Mullan Rd & Chuck Wagon Dr					
Control Type	Signalized					
Analysis Method	HCM 7th Edition					
Name	Chuck Wagon Drive	Mullan Road	Mullan Road			
Approach	Southbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Base Volume Input [veh/h]	100	61	23	904	201	41
Total Analysis Volume [veh/h]	109	66	25	983	218	45

Intersection Settings

Cycle Length [s]	90					
Active Pattern	Free Running					
Coordination Type	Free Running					
Actuation Type	Fully actuated					
Lost time [s]	0.00					
Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	7	0	0	2	6	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	0	10	10	0
Maximum Green [s]	20	0	0	60	60	0
Amber [s]	3.0	0.0	0.0	3.0	3.0	0.0
All red [s]	1.0	0.0	0.0	1.0	1.0	0.0
Split [s]	9	0	0	14	14	0
Walk [s]	7	0	0	7	7	0
Pedestrian Clearance [s]	12	0	0	12	12	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
I1, Start-Up Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
Minimum Recall	No			No	No	
Maximum Recall	No			No	No	
Pedestrian Recall	No			No	No	
Pedestrian Signal Group				0		
Pedestrian Walk [s]				0		
Pedestrian Clearance [s]				0		

Lane Group Calculations

g / C, Green / Cycle	0.12	0.12	0.65	0.65	0.65
(v / s)_i Volume / Saturation Flow Rate	0.07	0.05	0.02	0.58	0.17
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900
Arrival type	3		3		3
s, saturation flow rate [veh/h]	1629	1454	1021	1687	1585
c, Capacity [veh/h]	194	173	746	1093	1027
X, volume / capacity	0.56	0.38	0.03	0.90	0.26
d, Delay for Lane Group [s/veh]	16.80	15.32	3.97	8.09	2.68
-	-	-	-	-	-

Lane Group LOS	B	B	A	A	A
Critical Lane Group	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.78	0.45	0.03	0.91	0.04
50th-Percentile Queue Length [ft/ln]	19.45	11.14	0.84	22.71	0.93
95th-Percentile Queue Length [veh/ln]	1.40	0.80	0.06	1.64	0.07
95th-Percentile Queue Length [ft/ln]	35.01	20.06	1.51	40.88	1.67

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	16.80	15.32	3.97	8.09	2.68	2.68
Movement LOS	B	B	A	A	A	A
Critical Movement	Yes	No	No	No	No	No
d_A, Approach Delay [s/veh]	16.24		7.99		2.68	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]			8.03			
Intersection LOS			A			
Intersection V/C			0.650			

Option 3: Roundabout

Number	3					
Intersection	Mullan Rd & Chuck Wagon Dr					
Control Type	Roundabout					
Analysis Method	HCM 7th Edition					
Name	Chuck Wagon Drive	Mullan Road	Mullan Road			
Approach	Southbound	Eastbound	Westbound			
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Base Volume Input [veh/h]	55	43	64	391	807	117
Total Analysis Volume [veh/h]	60	47	70	425	877	127

Intersection Settings

Number of Conflicting Circulating Lanes	1	1	1	
Circulating Flow Rate [veh/h]	880	60	70	
Exiting Flow Rate [veh/h]	197	929	485	
Demand Flow Rate [veh/h]	55	43	64	391
Adjusted Demand Flow Rate [veh/h]	60	47	70	425
				807 117

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1380.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00102
HV Adjustment Factor	1.00	0.95	1.00	1.00	1.00
Entry Flow Rate [veh/h]	60	50	70	425	1007
Capacity of Entry and Bypass Lanes [veh/h]	638	638	1345	1345	1285
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	638	608	1345	1345	1282
X, volume / capacity	0.09	0.08	0.05	0.32	0.78

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	6.70	6.81	3.08	5.49	16.00
Lane LOS	A	A	A	A	C
95th-Percentile Queue Length [veh]	0.31	0.25	0.16	1.37	8.68
95th-Percentile Queue Length [ft]	7.76	6.27	4.11	34.26	217.01
Approach Delay [s/veh]	6.75		5.15		16.00
Approach LOS	A		A		C
Intersection Delay [s/veh]			12.04		
Intersection LOS			B		